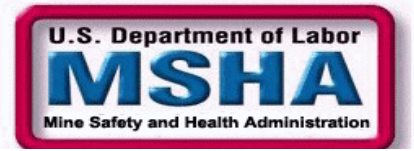
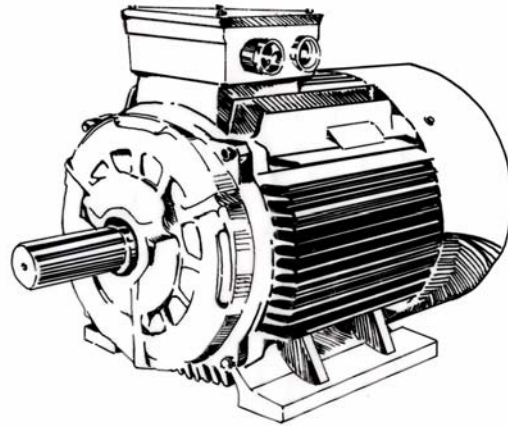
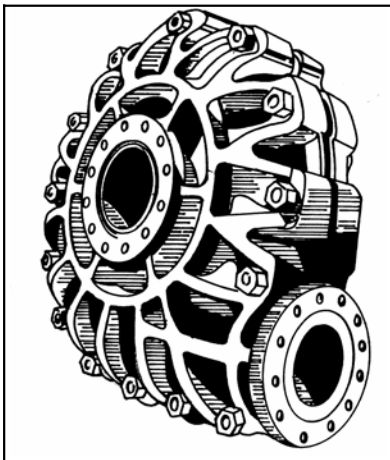
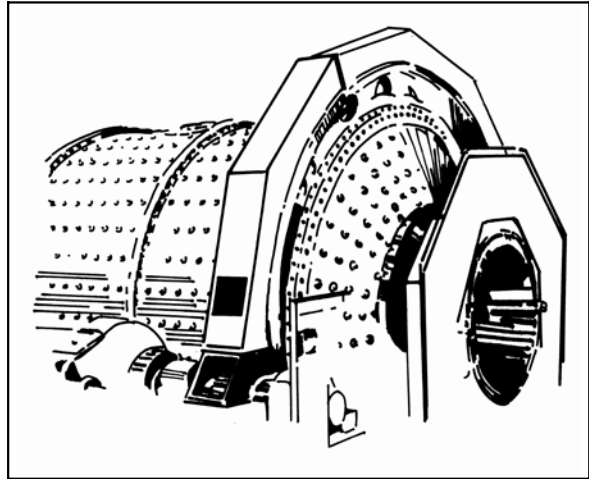
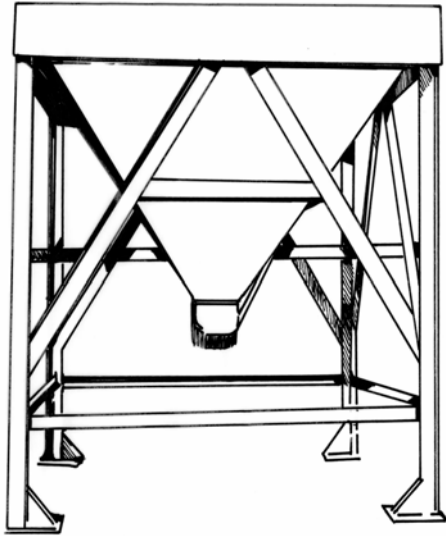


Noise Control Resource Guide – Mills and Preparation Plants



U. S. Department of Labor
Mine Safety and Health Administration



**U.S. Department of Labor
Mine Safety and Health Administration**

List of Contributors

The following people contributed to the writing and production of the series of Noise Control Resource Guides:

Jerry W. Antel (Retired) - Technical Support - PTAD
Anthony S. Argirakis - Technical Support – PTAD
Gene E. Autio – MNMS&H – Health Division
Doris Cash - MNMS&H – Division of Health
Calvin L. Cumerlato (Deceased) - Technical Support – PTAD
James L. Custer – Technical Support - Arlington
George Durkt Jr. - Technical Support – PTAD
Jennifer Honor – Office of the Solicitor
Michael Horbatko - CMS&H – District 9
Carol J. Jones – MNMS&H – Health Division
Paul T. Kinevy - Technical Support - PTAD
William Knepp - CMS&H - District 3
Dennis Lowmaster - CMS&H - District 2
Carla Marcum - CMS&H - District 7
Leonard C. Marraccini - Technical Support - PTAD
William McKinney - National Mine Health & Safety Academy
Gregory Meikle – CMS&H – Health Division
Carlos Mosley - CMS&H - District 3
Melinda Pon – CMS&H – Health Division
Bryan Sargent - CMS&H - District 8
John Schmeichel - Technical Support – PTAD
John P. Seiler – Technical Support - PTAD
Donald Starr - National Mine Health & Safety Academy
Wayne W. Woodruff - Technical Support - PTAD
David R. Zuchelli - Technical Support - PTAD

CONTENTS

Preface.....	1
Disclaimer	2
Introduction	3
Acoustical Materials	7
Flammability Guidelines.....	9
Mills and Preparation Plant Noise Controls	11
Centrifugal Dewaterer.....	15
Chutes	17
Compressors/Compressed Air.....	22
Crushers	26
Hoppers	31
Mills.....	34
Motors.....	36
Pumps	38
Screens - Classifying	41

Appendices

Preparation Plants:

A.	Partial listing of equipment manufacturers, addresses, Internet sites	45
B.	Suppliers list of acoustical materials	51
C.	Partial listing of aftermarket cab manufacturers, suppliers of stud-welding systems	70
D.	Literature references	73

NOISE CONTROL RESOURCE GUIDE MILLS AND PREPARATION PLANTS

PREFACE

The Mine Safety and Health Administration's (MSHA) Noise Control Resource Guide series is a compendium of resource information and guidance for reducing miners' noise exposures at coal and metal and nonmetal surface mines, underground mines, and mills and preparation plants. The Noise Control Resource Guides represent the Agency's continuing efforts to assist mine operators in lowering noise exposure, preventing miner hearing loss and achieving compliance with the Occupational Noise Exposure Standard (30 CFR Part 62).

Within this guide, you will find information that will help you:

- ❖ Identify noise sources on underground and surface mining machinery, and in mills and preparation plants.
- ❖ Determine the availability of engineering noise controls from original equipment manufacturers (OEMs) for new equipment.
- ❖ Identify sources of retrofit noise controls from the OEMs and after-market suppliers of noise controls, and in some cases, provides information on engineering controls that can be designed, fabricated, and installed at the mine site.
- ❖ Estimate the costs of engineering controls, where such costs are known.
- ❖ Identify contacts for machinery suppliers, and suppliers of sound and vibration controls and materials.

Technical experts and practitioners in the field of noise in the mining industry, as well as manufacturers of noise control equipment, provided information contained in this noise control resource guide. The material found in this guide should be considered a resource and not be construed to be a mandatory requirement. This guide should be used in conjunction with MSHA Program Information Bulletin (PIB) P04-18 "Technologically Achievable, Administratively Achievable and Promising Noise Controls (30 CFR Part 62)".

Due to the variability of the mining environment, it would be difficult to compile a document that would present controls that are feasible in each and every situation. The individual noise controls or series of controls found herein can reduce the exposure of most miners; however, they must be designed, tailored, and implemented according to the specific situation. Questions regarding technical applicability and feasibility of the controls to a specific mining situation should be referred to the local MSHA office.

DISCLAIMER

These guides are a compendium of resource information and guidance for reducing a miner's overexposure to noise. However, it is not an "all encompassing" answer to every problem dealing with overexposure to noise. There are three things the reader should keep in mind:

1. Every type of equipment used in mining operations is not included in these guides. Only the more common equipment types are discussed.
2. With regard to manufacturers of mining equipment and distributors of control products, the industry is a very dynamic one. Companies change names, merge; go out of business, relocate, etc. Thus, some of the information contained in the appendices may not be the most current. It is suggested that the reader may want to explore the Internet, or some of the monthly periodical magazines for current manufacturer/distributor information.
3. Reference to manufacturers is made to facilitate understanding and does not constitute an endorsement by the Mine Safety and Health Administration.

INTRODUCTION

The Mine Safety and Health Administration (MSHA) promulgated Health Standards for Occupational Noise Exposure for the metal, nonmetal and coal mining industry (30 CFR Part 62) in an effort to reduce the number of miners who will experience a material impairment of hearing. Part 62 establishes the full shift Permissible Exposure Level (PEL) at a TWA_8 of 90 dBA (100% Dose) and establishes an Action Level (AL) at a TWA_8 of 85 dBA (50% Dose). The operator is required to enroll affected miners in a Hearing Conservation Program if the Action Level is met or exceeded. If the PEL is exceeded, the mine operator is required to use all feasible engineering and/or administrative controls to reduce miner's exposure to the PEL.

The Noise Control Resource Guides deal with noise controls that are available on types of mining equipment typically used in different mining environments. The first guide covers surface mining, the second on underground mining, and the third on mills and preparation plants.

These guides will reference the type of mining equipment and noise controls that are available from the manufacturer of the equipment or as a retrofit for the equipment. If the cost of the control is well established and reliable, this information is also included. The guides do not address generic administrative controls that are universally accepted as being effective, i.e. rotation of workers, time limitations, distance, etc. However, if specific administrative controls have been shown to provide significant noise reduction, these administrative controls will be discussed with the equipment or the process. The guides also contain appendices that list equipment manufacturers, noise control products, aftermarket manufacturers, reference sources and contact information; however, these lists are not all inclusive.

NOISE EXPOSURE REDUCTION

In general, the amount of noise reduction achievable by, and the technologically achievability of a given noise control or a group of noise controls is widely variable and must be considered on a case-by-case basis. The amount of noise reduction that can be obtained from an individual noise control or suite of controls is dependent on a large number of factors:

- ❖ Type and model of machine
- ❖ Number and types of controls implemented
- ❖ Physical environment in which the machine is used
- ❖ Acoustical environment in which the machine is used
- ❖ Type of work the machine is performing
- ❖ Presence of other noise sources in the environment
- ❖ The degree to which the machine is noise-controlled prior to the installation of additional retrofit noise controls
- ❖ Quality of materials that are selected and used
- ❖ Quality of the installation of the controls
- ❖ Quality of the maintenance program for the machine
- ❖ Maintenance of noise controls
- ❖ Use of engineering controls in combination with administrative controls
- ❖ Experience of operator in using the machine

For these reasons, each of the machine and noise controls shown in this guide do not have specified noise reductions. Such figures are only obtainable after a complete acoustical investigation is conducted on each individual machine. Each noise control case study has a set of conditions that are unique to it.

Since the noise standards treat engineering controls equally with administrative controls, one may use either engineering or administrative controls or a combination of both to reduce miner's exposures. Each noise control guide is a valuable source of information for mine operators to use when deciding what type of mitigative action is best suited for the conditions encountered at their operation. In addition to the applicability of the control, the operator will need to consider the specific materials used when installing an engineering control. It is important to remember that the effectiveness of any engineering control used to reduce noise exposures is dependent on the appropriately selected, correctly installed and properly maintained acoustical material. As with most everything used in the mining industry, if an effective maintenance program is not put in place, the noise control will not last. Sometimes noise controls are expensive. It is in the operator's best interest to maintain the controls so as to reap the benefits of their investment.

DOSE FROM MULTIPLE NOISE SOURCES

Special considerations should be afforded to multiple noise sources, a situation common in the mining industry. Multiple noise sources present unique challenges in their measurement and control. The effectiveness of noise controls on multiple noise sources needs to be systematically evaluated in light of their contribution to a miner's exposure. To further illustrate this, consider the following:

When it is determined that there are multiple noise sources that contribute to a miner's noise exposure, and that these sources expose the miner to high levels of noise in a serial fashion, general noise control practices would direct you to lower the sound level of the highest noise source. However, noise exposure (dose) is a function of the sound level AND the amount of time the miner is exposed to the noise. Therefore, in planning which noise source(s) to treat, it is important to look at the sound level and the exposure time.

Table 1 illustrates the roles of sound level and exposure time. A particular miner's exposure is comprised of four levels and intervals: S1, a source of 90 dBA for 4 hours; S2, a source of 95 dBA for 2 hours; S3, a source of 100 dBA for 1 hour; and S4, a source of 88 dBA for 1 hour.

Table 1. - Data for Example Calculations Involving Multiple Sound Sources				
Source	Sound Level (dBA)	Measured Exposure Time (Hr.)	Allowable Exposure Time (Hr.)	% Contribution to PEL Dose
S1	90	4	8	50
S2	95	2	4	50
S3	100	1	2	50
S4	88	1	-	0
S3 mod	97	1	3.05	33
S1 mod	87	4	-	0
S2 mod	92	2	6.1	33

The miner's exposure $[S1 + S2 + S3 + S4]$, computed in terms of percent dose compared to the permissible exposure level (PEL), with a 90-dBA threshold for 8 hours, is 150% $[50 + 50 + 50 + 0]$.

By treating only the highest sound level source (S3) by application of an engineering noise control and reducing it from 100 dBA to 97 dBA (S3mod), the miner's exposure $[S1 + S2 + S3mod + S4]$ would be 133% $[50 + 50 + 33 + 0]$.

However, if the source to which the miner is exposed for most of the time (S1) is modified to obtain a 3-dBA reduction from 90 to 87 dBA [S1mod], the impact is to reduce the miner's exposure [S1mod + S2 + S3 + S4] to 100% [0 + 50 + 50 + 0]. Actually, a noise control yielding only a 1-dBA reduction applied to (S1) would achieve the same result.

If sources (S1) and (S2) are treated by 3 dBA each and reductions from 90 dBA to 87 dBA and from 95 dBA to 92 dBA obtained, the miner's resultant exposure [S1mod + S2mod + S3 + S4] would be 83% [0 + 33 + 50 + 0].

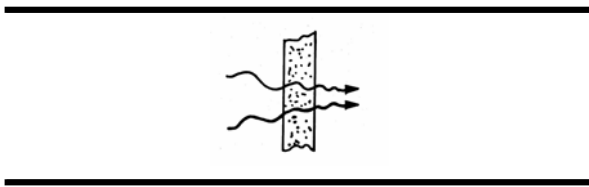
It is very important when conducting noise control work to examine the makeup of the miner's full shift noise exposure. The exposure may not be based solely on the highest sound level or the longest exposure time. It is the total noise dose, not just the individual sound levels or exposure times.

ACOUSTICAL MATERIALS

Acoustical materials can reduce noise either by absorbing or blocking sound waves, or damping vibrations. These materials are generally referred to as absorption, barrier, composite, and damping materials, and they can substantially increase the effectiveness of other acoustical devices. Selection of appropriate acoustical materials must be made based on a firm noise control engineering basis and commensurate to the task, properly installed, used, and maintained.

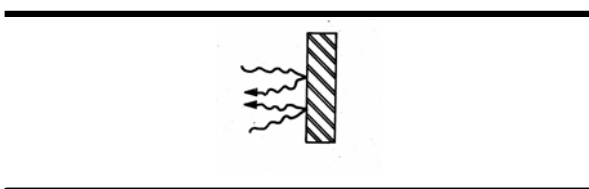
Acoustical devices include, but are not limited to, mufflers, silencers and enclosures. Absorption, barrier, composite, and damping/isolation materials are defined as follows:

Absorption



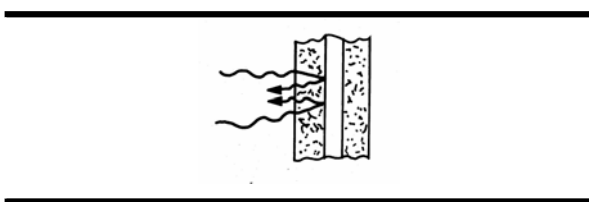
A material designed to absorb sound waves. It is not intended to be used for blocking sound waves. Some examples of absorption materials are foam and fiberglass. It may be used inside a cab or enclosure to prevent the reverberation of sound waves.

Barrier



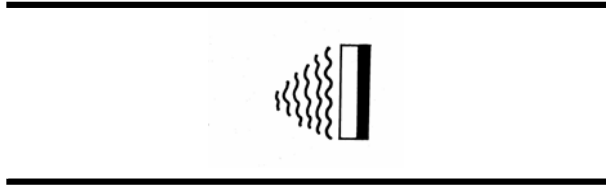
A material designed to block sound waves. It does not absorb sound waves. A typical use of barrier materials would be on the firewall of a bulldozer to block low frequency engine noise. Some examples of sound barriers are mass-loaded vinyl curtains, lead, plywood, glass, steel and concrete

Composite



A material designed to both absorb and block sound. It may be used to provide additional barrier qualities to an enclosure or operator cab as well as absorption of radiating sound waves. Some examples are combinations of foam, vinyl, fiberglass and lead.

Damping/Isolation



Materials designed to damp, remove the ring from vibrating surfaces and decouple source from structure.

Flammability Guidelines

Although current MSHA regulations do not restrict the use of acoustical materials due to their flammability characteristics, MSHA has established a voluntary guideline regarding the flame spread index of acoustical materials. These indices were established based upon the results of ASTM E-162 – Radiant Panel Tests. Basically, a flame spread index of 25 or less is recommended for acoustical materials installed on equipment used in underground mines and a flame spread index of 50 or less for acoustical materials installed on equipment used at surface operations. Prior to the selection, installation and use of acoustical materials, operators should be aware of their flammability properties.

Installation Methods

Acoustical materials may be installed in the following ways:

1. Adhesives – The use of an industrial adhesive requires a thorough cleaning of the surface area. The adhesive should then be applied according to the manufacturer's specifications. While the use of adhesives is economical and effective for installing the materials, the material cannot be removed intact and a potential hazard may exist from toxic fumes if subjected to intense heat. Also special solvents, that may have special conditions for use to avoid potential toxicity problems, may be needed to remove the adhesives.
2. Stud Welding – This method involves the use of a stud welder to attach a threaded, copper-coated stud to a metal surface such as a cab wall. The stud welder consists of a capacitance discharge unit and a hand-held triggering device, which holds the stud in place for welding. Upon release of the charge, an arc is struck between the tip of the stud and the metal surface, heating a small area. Simultaneously, the stud is plunged into the molten metal and the weld is completed. For a good quality weld the metal paint must be removed from the metal. The acoustical material is placed over the stud and secured with a rubber-cover button. This cover button not only holds the material in place, but offers a physical protection from the metal stud. The stud-welding method requires little surface preparation and allows for the removal and reinstallation of the materials for maintenance or repairs.

3. Bolts and Straps – Material may be held in place utilizing metal straps, which are secured by bolts and nuts at each end. This type of installation allows for easy removal and replacement of the acoustical material without damage. A perforated metal covering may be used in place of the straps to secure and protect the acoustical material.
4. Stick-on Studs – This method involves the use of threaded studs pre-welded to a metal disc having a self-adhesive backing. Surface preparation involves a thorough cleaning to remove oil, grease, or other contaminants. These studs may be attached to all types of surfaces. The materials are then pushed over the studs and held in place with a rubber-cover button. In some situations the weight of the acoustical materials may have an effect on the load bearing characteristics of the stick-on studs. Care should be taken.

COMPLIANCE ASSISTANCE

MSHA has produced several documents to aid the mining industry in complying with Part 62. These include:

- ❖ Hearing Protector Noise Reduction Rating List
- ❖ Compliance Guide to MSHA's Occupational Noise Exposure Standard – IG 33
- ❖ A Guide to Conducting Noise Sampling – IG 32
- ❖ Audiometric Testing Reference Guide for MSHA's Occupational Noise Exposure Standard – IG 57
- ❖ Program Information Bulletin (PIB) No. P04-05 - Basis for Assigning a P- Code for Noise Overexposure
- ❖ Program Policy Letter No. P04-IV-I and P04-V-1 Noise Enforcement Policy
- ❖ Program Information Bulletin (PIB) No. P04-18 "Technologically Achievable, Administratively Achievable and Promising Noise Controls" (30 CFR Part 62) dated August 2, 2004

MSHA will work with mine operators, miners, labor unions, industry associations, noise partnerships, mining equipment and noise control manufacturers, noise engineering professionals, and the National Institute for Occupational Safety and Health (NIOSH) in updating this document to reflect new solutions and experiences in controlling occupational noise exposures in the mining industry.

These compliance assistance documents are all available at MSHA's web site at <http://www.msha.gov>.

MILLS AND PREPARATION PLANT NOISE CONTROLS

This Noise Control Resource guide was developed to assist mine operators in controlling noise in Mills and Preparation Plants. It was prepared as an adjunct to the Mine Safety and Health Administration's (MSHA) implementation of the final rule for Occupational Noise Exposure, 30 CFR Part 62.

The first requirement in controlling noise is to identify the highest noise exposure tasks and the sources that contribute to the miner's noise exposure. Facility clean-up, equipment inspection, equipment maintenance, and plant circuit operators are typically the tasks where employees receive the highest noise dose. The most common noise generating sources are screens, chutes, crushers, motors, pumps, centrifugal dryers, and air compressors.

A general discussion on various engineering and administrative controls will precede a presentation of more equipment-specific controls. A listing of equipment manufacturers and distributors of noise control products is also provided as a resource.

1. ENGINEERING CONTROLS

Mills and preparation plants do not exhibit the acoustical characteristics of a single, constant diffuse noise field. There are many noise sources and the additive effects appear to generate one diffuse sound field having a constant sound level; however, distancing the miner from a specific noise source may result in a lowering of the noise exposure. Distance is a good noise control, but it is hard to administratively regulate; however, barriers may be used as a substitute for distance.

A. Barriers

Barriers reduce noise exposure by isolating miners from the sound source and can be applied to practically all noise sources. The barrier can be as simple as a suspended piece of curtain or as complex as a concrete wall or control room. The primary purpose is to disturb or interrupt the noise path. Many types of materials are available depending on the noise source and plant layout.

The use of clear vinyl curtains has been proven to provide a cost-effective barrier around equipment, walkways, stairwells, and work stations. Curtains can be purchased in various thickness, widths, and lengths, and are generally adaptable to most installations. There should be a sufficient overlap of curtains to ensure their effectiveness.



Clear Vinyl-Strip Curtain



Control Booth

Solid walls, floors, and total enclosures such as booths, can also be constructed as barriers. A variety of ordinary building materials may be used. Noise control materials may also be engineered into the construction.

B. Equipment Controls

Stationary pieces of equipment in mills and preparation plants are the primary noise generating sources. These are the large pieces of machinery that perform multiple functions, such as sizing and classifying the product. There have been no recent noise control innovations in the design of mills and preparation plant equipment; however, there are engineering principles that can be applied to reduce employee exposure.

A good routine maintenance program that includes tightening loose parts, lubrication, and replacement of worn material is a must. Vibration isolation mounts are also available for most equipment. The mounts help isolate the plant's components and reduce noise generation and transmission. Noise reduction can also be accomplished by replacement of existing components with quieter equipment, using a different process, or relocating equipment. This may not be feasible for larger pieces of equipment due to process requirements, size and cost; however, as facilities are upgraded or equipment wears out, these options should be considered.

C. Other Controls

Many processes in mills and preparation plants can be remotely monitored using technology. Remote cameras are available to watch certain areas in the plant to reduce the time miners spend in noisy areas. Technology also exists to monitor plant functions and adjust the material flow and processes from a remote location. Routine preventive maintenance and breakdowns can also be predicted by monitoring the temperature, vibration, and amperage of plant equipment.

Relocation of equipment controls is another method to reduce personnel noise exposure. Plant circuit operators can have their controls moved behind a barrier or into a quiet booth. Lubrication hoses can also be routed to a central location where noise controls can be utilized or the use of automatic lubrication devices implemented.

2. Administrative Controls

There are many possible combinations of administrative controls that may be used to reduce employee noise exposure. The issue is too variable and complex to discuss at length due to employee specialization, wage agreements, and employee availability, among other considerations.

The general techniques to consider are time management, including maintenance during idle time and worker rotation. In addition dividing routine work between different shifts and changing the actual shift length are administrative controls that can be utilized.

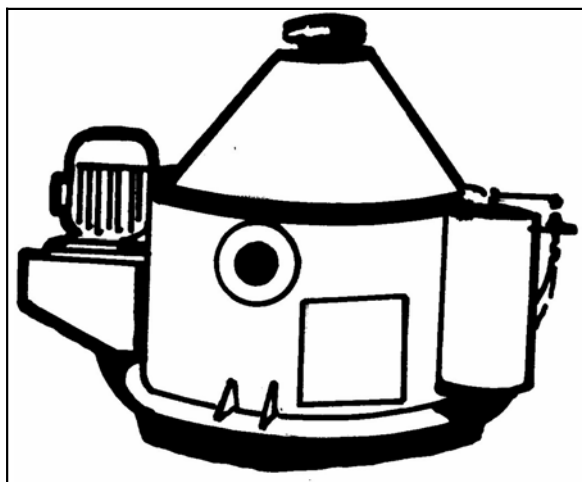
3. Summary

There is no single control that will eliminate mill and preparation plant noise. A combination of controls will be needed to reach the goal of reducing employee noise exposure. Meaningful reductions can be achieved with the use of some or all of the engineering controls discussed in this document. While reductions may not be attained with engineering controls alone, they may make previously impractical administrative controls feasible.

Due to longevity of mills and preparation plants, noise controls are an important consideration when these plants are designed and built. While controls should be engineered into new plant construction, where that has not been done, they should be added as a retrofit.

NOTE - Many of the controls previously discussed are applicable to all or some of the types of equipment listed on the following pages. They will not be repeated for each individual equipment type.

CENTRIFUGAL DEWATERER



A centrifugal dewaterer is a rotating device used to separate suspended colloidal particles such as clay or coal from slurry. The centrifugal forces created by the rotation causes the particles to move from the center of the dewaterer to the outside edges where they are collected.

1. Original Equipment Manufacturer (OEM)

The following is a list of OEMs that manufacture centrifugal dewatering machines.

- a. Bird Machine Company
- b. Conn-Weld Industries, Inc.
- c. Eimco Process Equipment
- d. Guyan Machinery, Inc.
- e. Krebs Engineers
- f. Sweco

Information from the manufacturers indicates that there is no noise controls incorporated into the new equipment of this type. Centrifugal dewatering machines without noise controls need to have additional retrofit noise controls.

2. Retrofit Noise Controls

This section is for centrifugal dewatering machines without noise controls. The effectiveness of noise controls is dependent upon the quality of both the acoustical materials and installation techniques.

If a retrofit kit is unavailable, the acoustical material may be purchased in bulk form using Appendix C as a reference.

The majority of noise associated with centrifugal dewatering equipment is produced by the high-speed circulating internal pump parts and drive motors.

A. Acoustical Enclosure Around the Equipment:

The enclosure can be either a prefabricated metal, lead-vinyl curtain, or a clear vinyl-strip curtain. The type of enclosure chosen will generally be determined by the equipment's dimensions, maintenance requirements and the cost of the enclosure.

Estimated Cost - The estimated cost of a pre-fabricated metal enclosure could range from \$10,000 for a single unit enclosure, to above \$40,000 for a multi-unit enclosure. Enclosures made of common building supplies should cost much less.

The cost of installing a flexible lead-vinyl curtain around the perimeter of the equipment could range from \$5 to \$20 per square-foot.

The cost of installing a clear vinyl-strip curtain around the perimeter of the equipment could range from \$2 to \$4.50 per square-foot.

Because of specific location constraints and maintenance entry requirements, an estimated upper range dollar value can vary dramatically.

B. Acoustical Enclosure for Operators in the Area

Operator enclosures can be purchased prefabricated with acoustical windows/doors, heating, air-conditioning, lighting, and communications already designed into the enclosure. An alternative to purchasing would be to construct an enclosure using common building supplies.

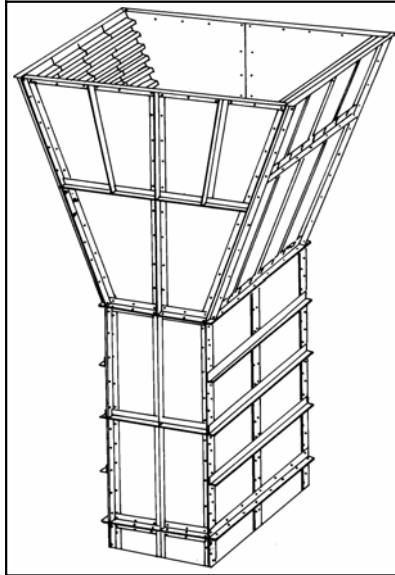
Estimated Cost - The cost of a pre-fabricated metal operator enclosure could range from \$3,000 to \$4,000 for a one-person enclosure with minimal amenities to above \$15,000 for a multi-person metal enclosure, which would include many of the amenities mentioned above.

Construction of an operator enclosure using common building supplies should cost 30%-70% less than a pre-fabricated enclosure.

3. Alternative Technology

There is no alternative technology.

CHUTES



Chutes are used to transport material in a confined area. They are commonly utilized in preparation plants allowing material to fall through them to a lower level for further processing or to be deposited for stockpiling.

1. Original Equipment Manufacturer (OEM)

The following table lists OEMs that have noise controls available for chutes. Local dealers should be contacted for specific needs and details.

Noise Control Availability from OEMs				
Manufacturer	Rubber-Line Chutes (Cost)	Ceramic Liners (Cost)	Abrasive-Resistant Material (Cost)	Rubber/Polyurethane Liners (Cost)
Aggregates Equipment, Inc.	X (\$15-\$20 per square foot)	None	None	None
Bulk Systems-Div. of Jervis B. Webb Co.	None	None	None	None
Ceramic Technology, Inc.	None	X (½" thick: \$30-40 per square foot) (1" thick: \$40-50 per square foot) (2" thick: \$60-75 per square foot)	None	None
Cerline Ceramic Corp.	None	X (½" thick: \$30-40 per square foot) (1" thick: \$40-50 per square foot) (2" thick: \$60-75 per square foot)	None	None
Chapel Steel Company	None	None	None	None
Daniels Company	None	None	None	None

Noise Control Availability from OEMs				
Manufacturer	Rubber-Line Chutes (Cost)	Ceramic Liners (Cost)	Abrasive-Resistant Material (Cost)	Rubber/Polyurethane Liners (Cost)
Kanawha Mfg. Company	None	None	None	None
Linatex Corp. Of America	None	None	X ($\frac{1}{4}$ " thick: \$9.30 per square foot) ($\frac{1}{2}$ " thick: \$18.10 per square foot)	None
W. W. Sly Mfg. Co.	None	None	None	None
Trellex-Div. of Sevedaia Industries	None	None	None	X ($\frac{1}{2}$ " thick: \$33 per square foot) (4" thick: \$85 per square foot)

"X" indicates product availability.

2. Retrofit Noise Controls

A. Chute Liners and Wear Resistant Material

The following table is a listing of retrofit noise controls, their costs, and their sources.

Retrofit Noise Control Availability from OEMs	
Manufacturer	Material (Cost)
Aggregates Equip, Inc.	Rubber-Lined Chutes Composite-Type Material (\$15 to \$20 per square foot)
Ceramic Technology, Inc.	Ceramic Liners (½" thick = \$30-\$40 per square foot) (1" thick = \$40-\$50 per square foot) (2" thick = \$60-\$75 per square foot)
Cerline Ceramic Corporation	Ceramic Liners (½" thick = \$30-\$40 per square foot) (1" thick = \$40-\$50 per square foot) (2" thick = \$60-\$75 per square foot)
Linatex Corp. Of America	Abrasive-Resistant Material (¼" thick = \$9.30 per square foot) (½" thick = \$18.10 per square foot)
Trellex-Division of Sevedaia Industries	Rubber and Polyurethane Liners (½" thick = \$33 per square foot) (4" thick = \$85 per square foot)

B. Rock Boxes/ Dead Beds

Another method to reduce the impact noise generated by the flow of material in chutes and hoppers is to create rock boxes or dead beds. This allows the product to accumulate in impact areas, resulting in the moving product impacting upon itself, instead of against the metal chute.

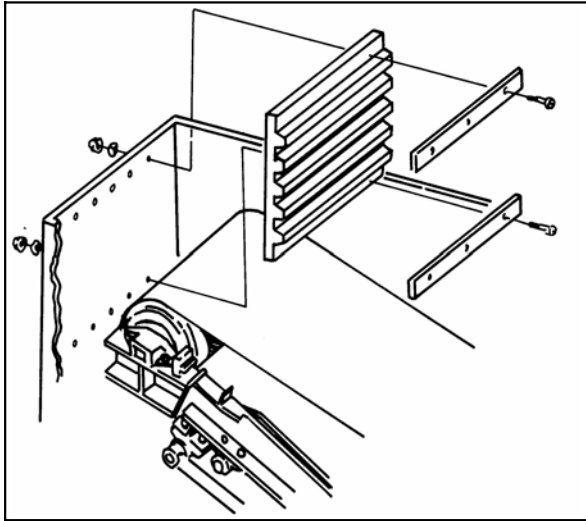
Estimated Cost - Because of specific location constraints and maintenance entry requirements, an estimated dollar value range could vary dramatically.

C. Wrapping Chute with Composite Acoustical or Vibration Damping Material

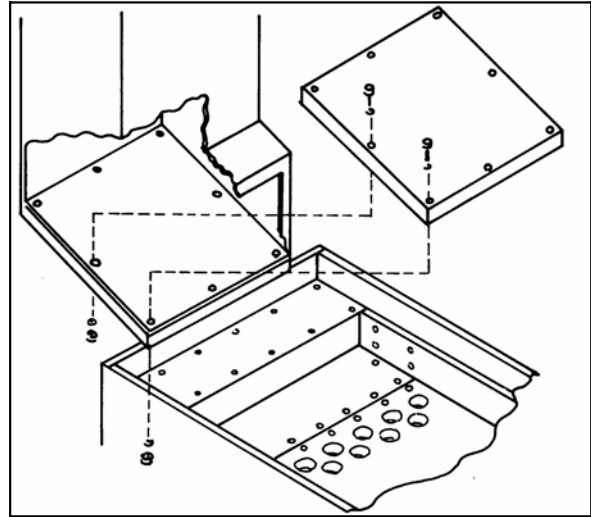
Enclosing the entire chute with a composite acoustical material can help contain some of the noise generated from the flow of material. The walls of the chute also vibrate when material strikes them. This vibration can be reduced by

applying or fastening a vibration damping material to the walls. The material is designed to strengthen the walls and reduce the resonance.

Estimated Cost - Because of specific location constraints and maintenance entry requirements, an estimated dollar value could vary dramatically. Contact some of the manufacturers listed in Appendix B for estimates.



Noise Damping Material Applied at a
Conveyer Transfer Point

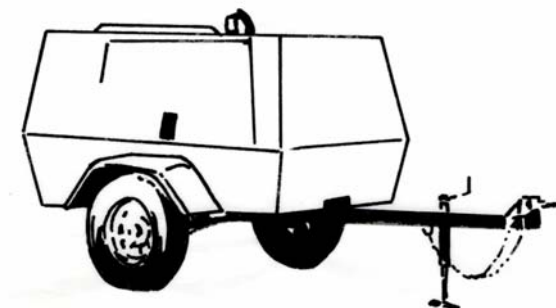


Noise Damping Material Applied to
the Base of a Chute

3. Alternative Technology

There is no alternative technology.

COMPRESSORS/COMPRESSED AIR



A compressor is a machine driven by a power take off, an internal combustion engine, or an electric motor to generate compressed air. This compressed air can be used to discharge cement from mills, carry material through air slides, and unblock clogs in chutes. Another use is to power drills on the surface and underground.

1. Original Equipment Manufacturer (OEM)

The following is a listing of the OEMs that have noise controls available for compressors. Local dealers and rebuild shops should be contacted for specific needs and details.

Noise Control Availability from OEMs	
Manufacturer	Noise Control
Joy Technologies	X
Sullair	X
Gardner-Denver	X
Ingersoll-Rand	X

“X” Indicates Availability

Information from the manufacturers indicates that the noise controls incorporated into the new equipment are in the form of sound absorption material behind door covers and exhaust mufflers. For compressors without noise controls, additional retrofit noise controls are needed.

2. Retrofit Noise Controls

This section is for compressors without noise controls. The effectiveness of noise controls is dependent upon the quality of both the acoustical materials and the installation techniques.

If a retrofit kit is unavailable, the acoustical materials may be purchased in bulk form using Appendix B as a reference.

The majority of noise associated with compressors is produced by the internal parts, cooling fan blades, and the compressed air exhaust.

A. Acoustical Enclosure Around the Equipment

The enclosure can be either a prefabricated metal, lead-vinyl curtain, or a clear vinyl-strip curtain. The type of enclosure chosen will generally be determined by the equipment's dimensions, maintenance requirements and the cost of the enclosure.

Estimated Cost - The estimated cost of a prefabricated metal enclosure could range from \$10,000 for a single unit enclosure, to above \$40,000 for a multi-unit enclosure. Enclosures made of common building supplies should cost much less.

The cost of installing a flexible, lead-vinyl curtain around the perimeter of the equipment could range from \$5 to \$20 per square foot.

The cost of installing a flexible clear vinyl-strip curtain around the perimeter of the equipment could range from \$2 to \$4.50 per square foot.

Because of specific location constraints and maintenance entry requirements, an estimated upper dollar value can vary dramatically.

B. Re-route the Intake and Exhaust of the Compressor and Various Air-Driven Tools

A 90-degree elbow can be installed on the intake of a compressor. The elbow will redirect the noise above the employees' ear level. An elbow may be purchased or constructed using common building supplies.



Example of a 90-degree
Elbow



Re-route Intake



Re-route Exhaust

The exhaust from air-driven tools and components can also be vented to another area of the plant or outside the facility. This can be accomplished using hydraulic hose and fittings or ordinary PVC pipe.

Estimated Cost - The cost of a prefabricated 90-degree elbow made of thin metal or fiberglass and hydraulic hose and PVC pipe will vary depending on length and diameter but should be inexpensive for most projects.

C. Acoustical Enclosure for Operators in the Area

Prefabricated operator enclosures can be purchased with acoustical windows/doors, heating, air conditioning, lighting, and communications already designed into the enclosure. An alternative would be to construct an enclosure using common building supplies.

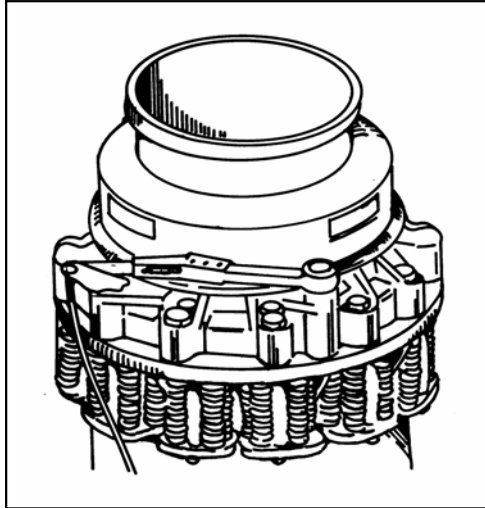
Estimated Cost - The cost of a prefabricated metal operator enclosure could range from \$3,000 to \$4,000 for a one-person enclosure with minimal amenities to over \$15,000 for a multi-person metal enclosure, which would include many of the amenities listed above.

Construction of an operator enclosure using common building supplies should cost 30%-70% less than a pre-fabricated enclosure.

3. Alternative Technology

There is no alternative technology.

CRUSHERS



Crushers are utilized to reduce the size of material passing through them. Among the various types of crushers are the cone, impact, gyratory, and roller. Crushers are frequently used in tandem with the primary crusher located in the pit and secondary ones in a processing plant. Underground crushers are utilized prior to transporting the ore out of the mine.

1. Original Equipment Manufacturer (OEM)

The following table illustrates OEMs that have noise controls available for crushers, but is not all inclusive. The companies listed represent the major suppliers of crushers.

Noise Control Availability from OEMs			
Manufacturer	Muffler	Engine Housing Lined with Absorptive Material	Remote Controls
Allis Mineral Systems-Crushing and Screening Division	None	None	None
Cedar Rapids, Inc.	*	None	None
Eagle Crusher Company, Inc.	*	None	None
Hazemag USA, Inc.	None	None	None
Jeffrey Division of Indresco, Inc.	None	None	None
Nordberg, Inc.	X	X	X
Pennsylvania Crusher Corporation	None	None	None
Stamler Corporation	None	None	None
Telsmith, Inc.	None	None	None

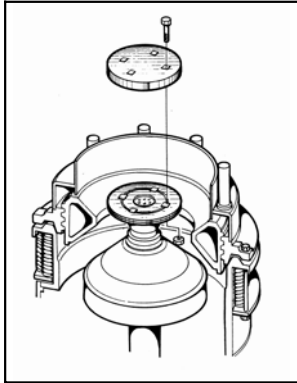
"X" indicates product availability.

*Portable crushers come equipped with a muffler.

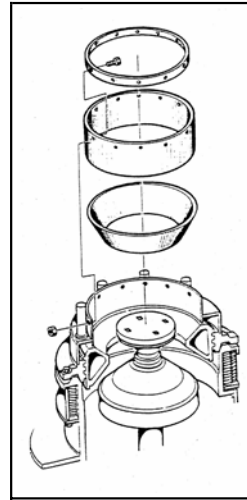
2. Retrofit Noise Controls

The utilization of retrofit noise controls on crushers is somewhat limited. None of the following manufacturers actively market noise controls for crushers. Resilient crusher feed plates, resilient feed cone liners, and mass-loaded barrier curtains are available from a variety of manufacturers (see Appendix B).

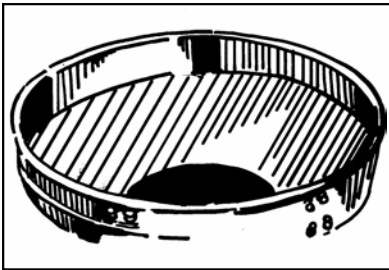
Retrofit Noise Control Availability from OEMs				
Manufacturer	Resilient Feed Plate	Resilient Cone Liner	Curtain Around Mainframe	Muffler, if required
Allis Mineral System, Inc.	X	X	X	X
Cedar Rapids, Inc.	X	X	X	X
Eagle, Inc.	X	X	X	X
Hazemag, Inc.	X	X	X	X
Hewitt-Robins	X	X	X	X
Jeffrey, Inc.	X	X	X	X
Nordberg, Inc.	X	X	X	X
Pennsylvania Crusher Corporation	X	X	X	X
Stamler Corporation	X	X	X	X
Telsmith, Inc.	X	X	X	X



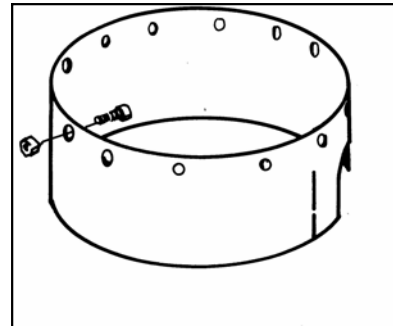
Installation of a Resilient Crusher
Feed Plate



Installation of Resilient
Crusher Feed Cone Shell



Installation of One-Piece
Resilient Crusher Feed Core
Liner.



Barrier Curtain for Crusher
Mainframe

If the crusher power is supplied by an internal combustion engine, an appropriately matched and maintained exhaust system is very effective in reducing the overall sound levels. The termination point of the muffler should be pointed away from the crusher operator.

A. Acoustical Enclosure for Operations in the Area

The most effective noise control that can be implemented in conjunction with crushers is a well designed, acoustically treated control booth. The effectiveness of such booths is greatly enhanced by structurally isolating them from the crusher or de-coupling them from the mainframe of the crusher with air bags. Visibility requirements can be met through either the use of appropriately positioned windows or with remote-controlled cameras.

B. Acoustical Enclosure Around the Equipment

The enclosure can be a prefabricated metal, lead-vinyl curtain, or clear vinyl-strip curtain. An acoustical enclosure may be the best alternative for small crushers. Large crushers should be located outside or away from the facility if possible.

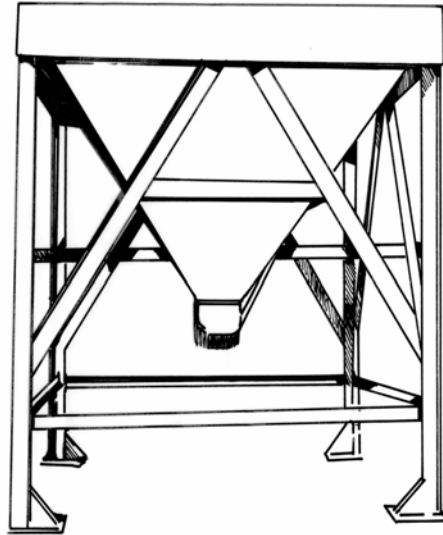
Estimated Cost - The estimated cost of a prefabricated metal enclosure could range from \$10,000 for a single unit enclosure, to over \$40,000 for a multi-unit enclosure. Enclosures made of common building supplies should cost much less.

The cost of resilient materials varies widely by manufacturers due to wear characteristics, fabrication requirements, and the necessary amount for the installation. Costs can range from \$300 to \$2,000. Various types of vinyl curtain material are approximately \$2.00 to \$4.50 per square foot. Mufflers can range in price from \$100 to \$250.

3. Alternative Technology

There is no alternative technology.

HOPPERS



Hoppers are vessels into which materials are fed for future discharge at a controlled rate. Typically they are constructed in an inverted pyramid or cone shape. They are most commonly found in the crushed stone and surface coal industries.

1. Original Equipment Manufacturer (OEM)

The following table illustrates OEMs that have noise controls available for new hoppers. Local dealers should be contacted for availability and further details.

Noise Control Availability from OEMs	
Manufacturer	Available Noise Controls
Daniels Company	None
Dover Conveyor and Equipment Company	None
Erwin Industries, Inc.	None
Manufacturers Equipment Company	None
E. F. Marsh Engineer Company	None
Pakco Industrial Ceramics, Inc.	None
Trelleborg	X
Universal Engineering	None
Vibra Screw, Inc.	None

"X" indicates product availability.

2. Retrofit Noise Controls

Retrofit noise control kits are not available from OEMs. Noise from impact points may be successfully treated through the installation of the products listed in the following table. Consultation with the manufacturers regarding specific applications is highly recommended in determining feasibility.

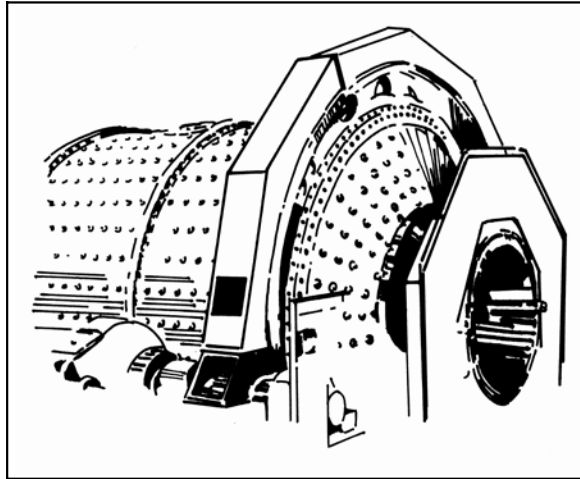
Retrofit Noise Control Availability from OEMs	
Manufacturer	Type of Material (Cost)
Aggregates Equipment, Inc.	Rubber-lined chutes with composite-type material (\$15-\$20 per square foot)
Ceramic Technology, Inc.	Ceramic liners (1/2" thick = \$30-\$40 per square foot) (1" thick = \$40-\$50 per square foot) (2" thick = \$60-\$75 per square foot)
Cerline Ceramic Corporation	Ceramic liners (1/2" thick = \$30-\$40per square foot) (1" thick = \$40-\$50per square foot) (2" thick = \$60-\$75per square foot)
Linatex Corporation of America	Abrasive-resistant material (1/4" thick = \$9.30per square foot) (1/2" thick = \$18.10 per square foot)
Trellex-Division of Sevedaia Industries	Rubber and polyurethane liners (1/2" thick = \$33 per square foot) (4" thick = \$85 per square foot)

For smaller hoppers and transfer areas the retrofit noise controls for chutes may be applicable. Acoustical operator enclosures with cameras may also be a solution.

3. Alternative Technology.

There is no alternative technology.

MILLS



Regardless of the type of mill (rod, ball, roller, hammer, etc.), their function is to reduce the size of the material that passes through them. This function is accomplished by impacting the material with metal, thereby creating a noise source in a shell.

1. Original Equipment Manufacturer (OEM)

The following is a partial listing of OEMs that have mills used in the mining industry.

- a. Allis Chalmers
- b. Humboldt Wedag
- c. F. L. Smidth
- d. TelSmith

Information from the manufacturers indicates that there is no noise controls incorporated into the design of this type of equipment. The only effective noise controls are described in Section 2.

2. Retrofit Noise Controls

The construction of an acoustically treated, operator control room, or booth in conjunction with remote controlled video cameras should minimize the need for a miner to be near the mill(s).

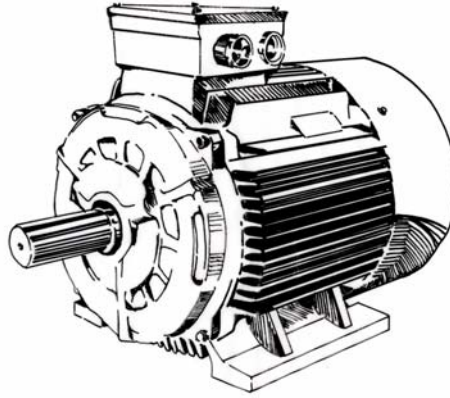
In some situations, the construction of a full or topless enclosure around a free-standing mill(s) has been demonstrated to be an effective method of reducing the overall sound levels for miners whose work station is in the area adjacent to the mill(s). Absorptive acoustical material may be needed within or above such enclosures.

Depending upon the type of milling, the utilization of rubber or synthetic liners can be very effective in reducing the overall sound levels.

3. Alternative Technology.

There is no alternative technology.

MOTORS



Motors are used throughout preparation plants to drive machinery, pumps, fans, shaker screens, crushers, conveyor belts, etc.

1. Original Equipment Manufacturer (OEM)

The following is a listing of the OEMs for motors. Local dealers and rebuild shops should be contacted for specific needs and details.

- a. Reliance
- b. General Electric

Information from the manufacturers indicates that there is no noise controls incorporated into the new equipment of this type. The majority of noise associated with motors is produced by the high-speed, revolving internal parts and the cooling fan blades. One-directional cooling fan blades can be installed for noise control on motors. They are quieter than the unidirectional ones. For details regarding retrofit approaches, see Section 2.

2. Retrofit Noise Controls.

This section is for motors without noise controls. The effectiveness of noise controls is dependent upon the quality of both the acoustic materials and the installation techniques.

If a retrofit kit is unavailable, the acoustical materials may be purchased in bulk form using Appendix B as a reference.

A. Acoustical Enclosure Around the Equipment

The enclosure can be a pre-fabricated metal, lead-vinyl curtain, or clear vinyl-strip curtain. The type of enclosure chosen will generally be determined by the equipment's dimensions, maintenance requirements and the cost of the enclosure.

Estimated Cost - The estimated cost of a prefabricated metal enclosure could range from \$10,000 for a single unit enclosure to over \$40,000 for a multi-unit enclosure. Enclosures made of common building supplies should cost much less.

The cost of installing flexible lead-vinyl curtain around the perimeter of the equipment could range from \$5 to \$20 per square foot.

The cost of installing clear vinyl strip curtain around the perimeter of the equipment could range from \$2 to \$4.50 per square foot.

Because of specific location constraints and maintenance entry requirements, an estimated upper range dollar value can vary dramatically.

B. Acoustical Enclosure for Operators in the Area

Pre-fabricated operator enclosures can be purchased with acoustical windows/doors, heating, air-conditioning, lighting, and communications already designed into the enclosure. An alternative to purchasing would be to construct an enclosure using common building supplies.

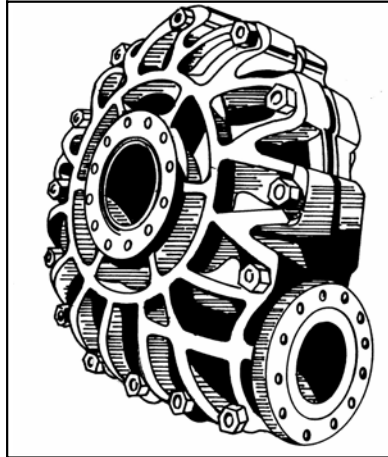
Estimated Cost - The cost of a prefabricated metal operator enclosure could range from \$3,000 to \$4,000 for a one-person enclosure with minimal amenities to over \$15,000 for a multi-person metal enclosure, which would include many of the above.

Construction of an operator enclosure using common building supplies should cost 30%-70% less than a prefabricated enclosure.

3. Alternative Technology.

There is no alternative technology.

PUMPS



Pumps are utilized to either push or pull liquids through a tube or pipe. They can be used to power automatic lubricating systems, provide water over shaker screens, reduce the level of water in sumps, and move slurries through centrifugal dewaterers.

1. Original Equipment Manufacturer (OEM)

The following is a listing of OEMs for pumps used in the mining environment. Local dealers should be contacted for specific needs and details.

- a. Eimco Process Equipment Company
- b. Envirotech Pump Systems
- c. GIW Industries, Inc.
- d. Goodwin Pumps
- e. ITT A-C Pumps
- f. Robbins & Myers, Inc.
- g. Versa-Matic Pump Company

Information from the manufacturers indicates that noise controls have not been incorporated into equipment of this type since the equipment is designed to move either a fluid or slurry. Many of the companies are precisely balancing the internal moving parts to reduce vibration. The pumps are powered by electric motors, hydraulic fluid, or compressed air. These power sources and/or pumps can sometimes be located inside buildings or enclosures to help reduce the overall noise. This is dependent upon the size and location of the equipment. Local dealers can generally advise customers on their particular application. For details regarding retrofit approaches, see Section 2.

2. Retrofit Noise Controls

This section is for pumps that are without noise controls or are not located inside an enclosure. The effectiveness of noise controls is dependent upon the quality of both the acoustic materials and the installation techniques.

Retrofit Noise Control Availability from OEMs	
Manufacturer	Resilient or Rubber Liner
Goodyear	X
Linatex	X
Trellex	X

“X” indicates product availability.

If a retrofit kit is unavailable, the materials may be purchased in bulk using Appendix B as a reference.

The majority of noise associated with pumps is produced by the motors/engines needed to operate the pumps and the high-speed, revolving internal parts.

A. Acoustical Enclosure Around the Equipment

The enclosure can consist of a prefabricated metal enclosure or a site-built enclosure using common building materials or dense loaded, vinyl-hanging curtain type arrangement. The type of enclosure will generally be determined by the equipment's dimensions, location, maintenance requirements and the cost of the enclosure. Another consideration would be if the enclosure will be permanent or temporary.

B. Acoustical Enclosure for Operators in the Area

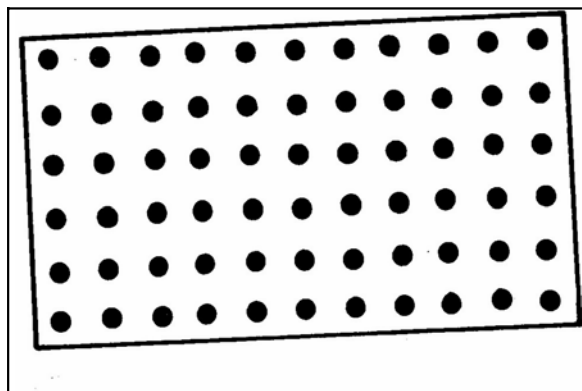
Pre-fabricated operator enclosures can be purchased with acoustical windows/doors, heating, air conditioning, lighting, and communications already designed into the enclosure. An alternative to purchasing would be to construct an enclosure using common building supplies.

Estimated Cost - The cost of a prefabricated metal operator enclosure could range from \$3,000 to \$4,000 for a one-person enclosure with minimal amenities to over \$15,000 for a multi-person metal enclosure, which would include many of the above.

Construction of an operator enclosure using common building supplies should cost 30%-70% less than a prefabricated enclosure.

3. Alternative Technology.

There is no alternative technology.

SCREENS – CLASSIFYING

Classifying screens are used both in preparation plants and outdoor facilities. They come in a number of configurations, i.e. single, double, or triple decks, wet, dry, or heated. Their basic function is to size the material that passes over them. This is accomplished by the size of the opening in the screen decking.

1. Original Equipment Manufacturer (OEM)

The following table illustrates the OEMs that have noise controls available for screens (classifying). Local dealers should be contacted for specific needs and details.

Noise Control Availability from OEMs			
Manufacturer	Rubber	Polyurethane	Air Shocks
Derrick Corporation	X	X	None
Durex Products	X	X	None
Hewitt-Robbins	X	None	None
Linatex	X	X	None
Ludlow-Saylor, Inc.	X	X	None
Polydeck Screen Corporation	X	X	None
Tema Screens, Inc.	None	X	None
Trellex, Inc.	X	X	None
Firestone Industrial Products	None	None	X

“X” indicates product availability.

Information from the manufacturers indicates that there is some noise controls incorporated into new equipment of this type. For classifying screens without noise controls, additional retrofit noise controls are needed.

For details regarding retrofit approaches, see Section 2.

2. Retrofit Noise Controls (Screens with built-in noise controls)

A. Acoustically Treated Decking

Screening equipment (total unit comprised of frame, motors, and decking) is generally ordered for specific customers needs; however, the decking is usually purchased from a manufacturer separate from the one building the screen equipment. If the purchaser requests acoustical decking and supplies (according to the specifications provided), it will be installed on the new equipment. This decking can be either rubber-clad, covered with a polyurethane material, or a combination of both.

Estimated Cost - The general consensus for comparing the cost of rubber and polyurethane decking to the conventional steel decking is that the rubber and polyurethane decking will cost up to 5 times more than the cost of the steel decking. Prices quoted were from \$30-\$80 per square foot for polyurethane decking as compared to costs of \$10-\$20 per square foot for steel. Depending upon its application, the treated decking should wear longer than the steel.

B. Pre-Specified Buyer Noise Controls

Screening equipment manufacturers will attempt to incorporate any noise controls into the new equipment that the purchaser specifies at the time of the order.

Estimated Cost - These options are discussed and priced in Section 3-B.

3. Retrofit Noise Controls (Screens without noise controls)

This section is for classifying screens without noise controls. The effectiveness of noise controls is dependent upon the quality of both the acoustic materials and installation techniques.

If a retrofit kit is not available, the materials may be purchased in bulk form using Appendix B as a reference.

The majority of noise associated with classifying screens is produced by the vibration of the screen/frame and the material being transported over the screen.

A. Install New Decking Material

Replace the screen decking with newer polyurethane based decking if possible. This would also include non metallic or dampened steel side plates where material would also impact.

Estimated cost - The cost of polyurethane-based decking is \$30-\$80 per square foot. The cost of dampened steel plates is \$20-\$50 per square foot depending upon steel thickness and fabrication designs.

B. Install New Suspension Springs

Install new suspension springs to the deck framing so that vibration is contained to the unit and isolated from other structures. These can be in the form of rubber, coil spring, or air bag suspension where applicable.

Estimated cost - The cost of new suspension, either rubber or spring, can range from \$50-\$4,000 per mount.

C. Acoustical Enclosure for Operators in the Area

Operator enclosures can be purchased prefabricated with acoustical windows/ doors, heating, air conditioning, lighting, and communications already designed into the enclosure. An alternative to purchasing would be to construct an enclosure using common building supplies.

Estimated Cost - The cost of a prefabricated metal operator enclosure could range from \$3,000-\$4,000 for a one-person enclosure with minimal amenities, to over \$15,000 for a multi-person metal enclosure, which would include many of the above.

Construction of an operator enclosure using common building supplies should cost 30%-70% less than a prefabricated enclosure.

D. Acoustical Enclosure Around the Equipment

The enclosure can be a prefabricated metal, lead-vinyl curtain, or clear vinyl strip curtain type. The type of enclosure chosen will generally be determined by the equipment's dimensions, maintenance requirements, and cost of the enclosure.

Estimated Cost -Estimated Cost - The estimated cost of a prefabricated metal enclosure could range from \$10,000 for a single unit enclosure to over \$40,000 for a multi-unit enclosure. Enclosures made of common building supplies should cost much less.

The cost of installing flexible lead-vinyl curtain around the perimeter of the equipment could range from \$5 to \$20 per square foot.

The cost of installing clear vinyl strip curtain around the perimeter of the equipment could range from \$2 to \$4.50 per square foot.

Because of specific location constraints and maintenance entry requirements, an estimated upper range dollar value can vary dramatically.

E. Acoustical Enclosure Around Drive Mechanisms

Fabricate small acoustical enclosures around drive mechanisms to isolate and control this noise.

Estimated cost - The cost of fabricating these small enclosures will be dependent upon the size, location, and materials. In addition, cost will also depend upon how the enclosure is constructed so that maintenance can be conducted easily, while allowing for reinstallation or resealing. The cost of designing, fabricating, and installing an enclosure of this type can range from \$300 to over \$1,000. Enclosures made of common building supplies should be considerably less expensive.

4. Alternative Technology.

There is no alternative technology.

APPENDIX A

A Partial Listing of Machine Manufacturers

Manufacturer

Aggregates Equipment, Inc.
9 Horseshoe Road
PO Box 39
Leola, PA 17540-0039
(717) 656-2131
(717) 656-6686 (fax)

Allis-Chalmers Corporation
4180 Cherokee Drive
Brookfield, WI
(414) 475-2000

Allis Mineral Systems
20965 Crossroads Circle
Waukesha, WI 53186
(414) 475-3000
Fax (414) 475-2521

Bird Machine Company
100 Neponset Street
South Walpole, MA 02071
(508) 668-0400
Fax (508) 668-6855

Bulk Systems a Division of
Jervis B. Webb Company
34375 W. 12 Mile
Farmington Hills, MI 48331-3375
(810) 553-1000
Fax (810) 553-1253
www.jervisbwebb.com

Cedarapids, Inc.
916 16th Street Northeast
Cedar Rapids, IA 52402-4699
(319) 363-3511
(319) 399-4871 (fax)

Ceramic Technology, Inc.
275 Wardell Industrial Park
Cedar Bluff, VA 24609
(540) 964-6724

Manufacturer

Cerline Ceramic Corporation
1415 Fairview Street
Anderson, IN 46016
(765) 649-7222
(765) 649-6632 (fax)

Chapel Steel
414 Commerce Drive
Fort Washington, PA 19034
(215) 793-0899
Fax (215) 793-0919
www.chapelsteel.com

Cisco-Eagle
2120 Valley View Lane
Dallas, TX 75234
(972) 406-9330
Fax (972) 406-9577
www.cisco-eagle.com

Conn-Weld Industries, Inc.
P. O. Box 5329
Princeton, WV 24740
(304) 487-1421
Fax (304) 487-3761

Daniels Company
Rt 5 Box 203
Bluefield, WV 24701-9014
(304) 327-8161
Fax: (304) 327-5118

Derrick Corporation
590 Duke Road
Buffalo, NY 14225
(716) 683-9010
Fax: (716) 683-4991
www.derrickcorp.com

Manufacturer

Dover Conveyor & Equipment Co.
P. O. Box 300
Midvale, OH 44653
(740) 922-9390
(740) 922-9391

Durex Products, Inc.
112 First Ave., West
Luck, WI 54853
(715) 472-2111
Fax: (715) 472-2115

E. F. Marsh Engineering Company
1400 Hanley Industrial Drive
St. Louis, MO 63144-1972
(314) 968-4700
Fax: (314) 968-4705
www.marcoconvey.com

Eagle Crusher Company
525 South Market Street
Galion, OH 44833
(419) 468-2288

Eimco Process Equipment Company
669 East 200 South
Salt Lake City, UT 84102-0213
(801) 526-2000
(802) 526-2911 (fax)

Eimco Coal Machinery, Inc.
2 Paisley Industrial Park
Carmichaels, PA 15320
(724) 966-8700

Manufacturer

EnviroTech Pump Systems
Weir Specialty Pumps
440 West 800 South
P. O. Box 209
Salt Lake City, UT 84101-0209
(801) 359-8731
Fax: (801) 355-9303
www.envirotechslc.com

F. L. Smidth, Inc.
2040 Avenue C
Bethlehem, PA 18017-2188
(610) 264-6011
Fax: (610) 264-6170
www.flsmidth.com

Firestone Industrial Products
12650 Hamilton Crossing Blvd.
Carmel, IN 46032
(317) 818-8600
www.firestoneindustrial.com

Gardner Denver, Inc.
1800 Gardner Expressway
Quincy, IL 62301
(217) 222-5400
www.gardnerdenver.com

General Electric
3535 Easton Turnpike
Fairfield, CT 06431
(203) 373-2211
www.ge.com

GIW Industries
5000 Wrightsboro Road
Grovetown, GA 30813-9750
(706) 863-1011
Fax: (706) 860-5897
www.giwindustries.com

Manufacturer

Goodwin International, LTD.
Goodwin House
Leek Road
Hanley, Stoke-on-Trent
Staffordshire, UK ST1 3NR
+44-1782-208-060
Fax +44-1782-208-060
www.goodwin.co.uk

Goodyear Tire & Rubber Co.
1144 E. Market Street
Akron, OH 44316
(330) 796-2121
Fax: (330) 796-2222
www.goodyear.com

Guyan Machinery Co.
Box 150
Chapmanville, WV 25508
(800) 999-3888
Fax: (304) 855-8601

Hager Equipment Co., of Alabama, Inc.
1901 Morgan Road S. E.
Bessimer, AL 35022-4812
(205) 424-1363

Hazemag USA, Inc.
Mt. Braddock Road
Uniontown, PA 15401
(724) 439-3512
www.hazemag.com

Hewitt-Robins Conveyor
40 Fairfield Place
West Caldwell, NJ 07006
(973) 777-5500
(973) 777-1775 (fax)

Manufacturer

Humboldt Wedag, Inc.
400 Technology Parkway
Norcross, GA 30092
(770) 810-7300
Fax: (770) 810-7343
www.humboldt-wedag.com

Ingersoll-Rand
200 Chestnut Ridge Road
P. O. Box 8738
Woodcliff Lake, NJ 07675
(201) 573-3366
(201) 573-0000

ITT A-C Pumps
Goulds Pumps Headquarters
240 Fall Street
Seneca Falls, NY 13148
(315) 568-2811
Fax: (315) 568-2418
www.gouldspumps.com

Jeffrey Div of Indresco, Inc.
274 East 1st Avenue
Columbus, OH 43201
(614) 297-3123
(614) 297-3036 (fax)

Kanawha Manufacturing Co.
P. O. Box 1786
Charleston, WV 25326-1786
(304) 342-6127
Fax: (304) 343-4113
www.kanawhamfg.com

Krebs Engineers
5505 West Gillette Road
Tucson, AZ 85743
(520) 744-8200
(520) 744-8300
www.krebs.com

Manufacturer

Linatex
PO Box 899
1550 Airport Road
Gallatin, TN 37066
(615) 230-2100
(615) 230-2101 (fax)
www.linatex.com

Ludlow-Saylor, Inc.
1402 East Old Highway 40
PO Box 430
Warrenton, MO 63383
(314) 456-8200 or (800) 325-4975
(314) 465-4416 (fax)

Manufacturers Equipment Company
35 Enterprise Drive
Middletown, OH 45044
(513) 424-3573
Fax: (513) 424-3576

Norton Pakco Industrial Ceramics
55 Hillview Avenue
Latrobe, PA 15650
(412) 539-6000
Fax: (412) 539-6070

Nordberg, Inc.
3073 South Chase Avenue
Milwaukee, WI 53207
(414) 769-4300 or (800) 558-6818
(414) 769-4730 (fax)

Pennsylvania Crusher Corporation
600 Abbott Drive
PO Box 100
Broomall, PA 19008-0100
(610) 544-7200
(610) 543-0190
buster@penncrusher.com
www.penncrusher.com

Manufacturer

Polydeck Screen Corporation
175 Davis Chapel Road
Spartanburg, SC 29307
(864) 579-4594
(864) 579-2819 (fax)

Reliance Electric Motors
6040 Ponders Court
Greenville, SC 29615
(864) 297-4800
Fax (864) 281-2433
www.reliance.com

Robbins & Myers, Inc.
1400 Kettering Tower
Dayton, OH 45423
www.robbinsmyers.com

Smart Screen Systems, Inc.
6 Southeast First Street
Chisholm, MN 55719
(218) 254-4286
Fax: (218) 254-2525
www.smartscreensystems.com

Stamler Corporation
(An Oldenburg Group Company)
PO Box 307
Millersburg, KY 40348
(606) 484-3431
(606) 484-3336 (fax)

Sullair Corporation
3700 East Michigan boulevard
Michigan City, IN 46360
(219) 879-5451
Fax (219) 874-1252
www.sullair.com

Manufacturer

Sweco
P. O. Box 1509
8029 U. S. Highway 25
Florence, KY 41022
(859) 283-8400
Fax: (859) 283-8469
www.sweco.com

Telsmith, Inc.
10910 North Industrial Drive
PO Box 539
Mequon, WI 53092-0539
(414) 242-6600 or (800) 765-6601
(414) 242-5812 (fax)
sales@telsmith.com

Tema Systems, Inc. - USA
7806 Redsky Drive
Cincinnati, OH 45249
(513) 489-7811
(512) 489-4817 (fax)
www.tema1-usa.com/corp.htm

Trelleborg
400 Aylworth Ave
South Haven, MI 49090
(616) 637-2116
Fax: (616) 637-8315
www.trelleborg.com

Universal Engineering
800 First Ave., N.W.
Cedar Rapids, IA 52405
(319) 365-0441
Fax: (319) 369-5440

Manufacturer

Versa-Matic Pump Company
6017 Enterprise Drive
Export, PA 15632
(724) 327-7867
Fax: (724) 327-4300
www.versamatic.com

Vibra Screw Incorporated
755 Union Boulevard
Totowa, NJ 07512
(973) 256-7410
(Fax: (973) 256-7567
www.vibrascrewinc.com

W. W. Sly Manufacturing Company
P. O. Box 5939
Cleveland, OH 44101
(216) 238-2000
Fax: (216) 238-3139

APPENDIX B

Buyer's Guide for Noise Control Products

(Reproduced with permission of *Sound and Vibration* magazine.)

SOUND ABSORPTIVE MATERIALS

1. Felts
2. Foams
3. Glass Fiber
4. Mineral Fiber
5. Perforated Sheet Metal
6. Spray-On Coatings
7. Wall Treatments

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165;
FAX (508) 429-8545; americanacoustic@aol.com - (2,3,4,5,7)

BASF Corp.; 1609 Biddle, Wyandotte, MI, 48192; (734) 324-6292; FAX (734) 324-5245
edwardga@basf.com; - (2)

Blachford, Inc., 1400 Nuclear Drive, West Chicago, IL 60185; (630) 231-8300;
FAX (630) 231-8321 - (2,3)

Comercial Acoustics; 5960 W. Washington St., Phoenix, AZ 85043; (602) 233-2322;
FAX (602) 233-2033; www.mfmca.com - (5)

Diamond Manufacturing Co., 243 W. Eighth St., Wyoming, PA 18644; (800) 233-9601;
FAX (717) 693-3500; perf@dmc.microserve.com - (5)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268;
(317) 692-1111; FAX (317) 692-3111; solutions@ears.com - (2)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221;
FAX (617) 547-2171; eckel@eckelacoustic.com - (2,3)

Empire Acoustical Systems, 36744 Constitution Dr., Trinidad, CO 81082; (719) 846-2300;
FAX (719) 846-7466; empmkico@rmi.net - (4,5)

ESSI Acoustical Products Co., 11740 Berea Rd., Cleveland, OH 44101; (800) 886-6678;
FAX (216) 251-9933; eacoustical@aol.com - (3,4,7)

Ferguson Perforating, 130-140 Ernest St., Providence, RI 02905; (401) 941-8876;
FAX (401) 941-2950 - (5)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555;
FAX (612) 521-5639; sales@illbruck.com - (2,7)

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, NY 10462; (718) 931-8000;
FAX (718) 863-1138; info@industrialacoustics.com - (5,7)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480;
FAX (614) 889-0540; vib@kineticsnoise.com - (2,3,5,7)

McGill Air Pressure Corp.; 2400 Fairwood Ave., Columbus, OH 43207; (614) 443-0192
FAX (614) 542-2620 www.mcgillairpressure.com - (2,3,4,5,6,7)

MPC, Inc., 835 Canterbury Rd., Westlake, OH 44145; (440) 835-1405;
FAX (440) 835-9313 - (7)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283;
(507) 641-3067; FAX (507) 644-3737; noisered@means.net - (2,3)
Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777;
FAX (781) 246-0888 - (2-4,6,7)
Polymer Technologies Inc.; 420 Corporate Blvd., Newark, DE 19702; (302) 738-9001;
FAX (302) 738-9085; loretta@polytechnic.com
Pyrok, Inc., 121 Sunset Rd., Mamaroneck, NY 10543; (914) 777-7070;
FAX (914) 777-7103 - (6)
Rogers Corp., One Technology Dr., Rogers, CT 06263; (860) 794-9605;
FAX (860) 779-5509 - (2)
Roush Anatrol, Inc., 935 Benecia Ave., Sunnyvale, CA 94086; (408) 481-1090;
FAX (408) 481-1096 - (2)
Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089;
FAX (773) 235-0363 - (2,3,7)
Soundcoat, Inc., 1 Burt Drive, Deer Park, NY 11729; (516) 242-2200; FAX (516) 242-2246;
sales@soundcoat.com - (1,2,6,7)
Sound Fighter Systems, 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640
FAX (318) 865-7373; soundfighter@soundfighter.com - (4)
Sound Seal; 50 HP Almgren Dr. Agawam, MA 01001; (413) 789-1790 FAX (413) 789-4444
sales@soundseal.com - (2,3,6,7)
Tamer Industries, 185 Riverside Ave., Somerset, MA 02725; (508) 677-0900;
FAX (508) 677-3037 - (4,7)
Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (1,2,6)
Tectum, Inc., P.O. Box 3002, Newark, OH 43058; (888) 977-9691; FAX (800) 832-8869;
arid@tectum.com - (7)
The E. J. Davis Co., 10 Dodge Ave., P. O. Box, North, CT 06473; (203)-239-5391;
FAX (203) 234-7724 cs@ejdavis.com; www.ejdavis.thomasre
The Proudfoot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034;
FAX (203) 459-0033 - (2,3,7)

SOUND ABSORPTIVE SYSTEMS

1. Ceiling Systems
2. Masking Noise Generators
3. Panels
4. Unit Absorbers
5. Wall Treatments

Acoustic Systems, 415 E St. Elmo Rd., Austin, TX 78745; (800) 749-1460;

FAX (512) 444-2282; acoustic@inetport.com, - (1-3)

American Acoustics, 6 October Hill Rd., Holliston, MA 01746; (508) 429-1165;

FAX (508) 429-8545 americanacoustic@aol.com - (2,3,4,5,7)

Commercial Acoustics Div., 5960 W. Washington St., Phoenix, AZ 85043;

(602) 233-2322; FAX (602) 233-2033 - (3)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221;

FAX (617) 547-2171; eckel@eckelacoustic.com - (1,3-5)

Empire Acoustical Systems, 36744 Constitution Dr., Trinidad, CO 81082; (719) 846-2300;

FAX (719) 846-7466; empmkico@rmi.net - (1-3,5)

ESSI Acoustical Products Co., 11740 Berea Rd., Cleveland, OH 44101; (800) 886-6678;

FAX (216) 251-9933; eacoustical@aol.com - (3-5)

George Koch Sons, Inc., 10 S. 11th Ave., Evansville, IN 47744; (888) 873-5624;

FAX (812) 465-9876; ddh@kochg.com - (3)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555;

FAX (612) 521-5639; sales@illbruck.com - (1,3)

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, NY 10462; (718) 931-8000;

FAX (718) 863-1138; info@industrialacoustics.com - (1,3-5)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480;

FAX (614) 889-0540; vib@kineticsnoise.com - (1-3,5)

MBI Products Co., 5309 Hamilton Ave., Cleveland, OH 44114; (216) 431-6400;

sales@mbiproducts.com www.mbiproducts.com (1,3,5)

McGill Air Pressure Corp., 2400 Fairwood Ave., Columbus, OH; (614) 443-0192;

FAX (614) 542-2620 www.mcgillairpressure.com- (3)

MPC, Inc., 835 Canterbury Rd., Westlake, OH 44145; (440) 835-1405;

FAX (440) 835-9313 - (1,3,5)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777;

FAX (781) 246-0888 - (1-5)

Pyrok inc., 121 Sunset Rd., Mamaronec, NY, 10543; (914) 777-7070; FAX (914) 777-7103;

info@pyrokinc.com www.pyrokinc.com - (1)

Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089;

FAX (773) 235-0363 - (1-3,5)

Sound Fighter Systems, Inc., 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640;
FAX (318) 865-7373 - (3)

Sorbothane Inc., 2144 State Rt. 59 Kent, OH 44240; (330) 678-9444; FAX (330) 678-1303;
sales@sorbothane.com - (5)

Tamer Industries, 185 Riverside Ave., Somerset, MA 02725; (508) 677-0900;
FAX (508) 677-3037 - (3-5)

Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (3)

The Proudfoot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034;
FAX (203) 459-0033 - (2-5)

SOUND BARRIER MATERIALS

1. Pipe Lagging
2. Plain and Mass-Loaded Plastics
3. Sealants and Sealing Tapes
4. Sheet Glass, Metal and Plastic

American Acoustical, 6 October Hill Rd., Holliston, MA 01746; (508) 239-1165
FAX (508) 239-8545; americanacoustic@aol.com - (1,2)

Amorim Industrial Solutions; 1015 Memorial Dr., Manitowoc, WI 54220 (920) 683-9998;
FAX (920) 683-9994; dkvckins@amerimsolutions.com - (2)

Blachford, Inc., 1400 Nuclear Drive, West Chicago, IL 60185; (630) 231-8300;
FAX (630) 231-8321 - (2)

Dodge-Regupol Inc., 715 Fountain Ave., Lancaster, PA 17601; (717) 295-3400;
FAX (717) 295-3414; www.regupol.com - (1)

Duracote Corp., 350 N. Diamond St., P.O. Box 1209, Ravenna, OH 44266; (800) 321-2252;
FAX (330) 296-5102; custserv@duracote.com - (1,2)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268;
(317) 692-1111; FAX (317) 692-3111; solution@ears.com - (1,2,4)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555;
FAX (612) 521-5639; sales@illbruck.com - (1)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480;
FAX (614) 889-0540; vib@kineticsnoise.com - (1,2)

McGill Air Pressure Corp., 2400 Fairview Ave., Columbus, OH 43207; (614) 443-0192
FAX (614) 542-2620; www.mcgillairpressure.com - (1,2,4)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283;
(507) 641-3067; FAX (507) 644-3737; noised@means.net - (1,3)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777;
FAX (781) 246-0888 - (1-3)

Polymer Technologies Inc., 420 Corporate Blvd., Newark, DE 19702; (302) 738-9001
FAX (302) 738-9085; loretta@polytechnic.com - (2,6)

Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089;
FAX (773) 235-0363 - (2)

Soundcoat, Inc., 1 Burt Drive, Deer Park, NY 11729; (516) 242-2200; FAX (516) 242-2246;
sales@soundcoat.com - (1,2)

Sound Fighter Systems, 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640;
FAX (318) 865-7373; soundfighter@soundfighter.com; www.soundfighter.com - (4)

Sound Seal, 50 HP Almgren Dr., Aganam, MA 01001 (413) 789-1770; FAX (413) 789-4444
sales@soundseal.com - (2,3,6,7)

Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (1,2))

The Kennedy Company, 11665 Al Hwy 79, P.O. Box 1216, Scottsboro, AL 35768;
(256) 259-4436; FAX (256) 259-6253 - (1,2)

The Proud Foot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034;
FAX (203) 459-0033 - (1,2)

SOUND BARRIER SYSTEMS

1. Curtains
2. Doors
3. Operable Partitions
4. Panels
5. Seals
6. Transportation Noise Barriers
7. Walls
8. Windows

Acoustic Systems, 415 E St. Elmo Rd., Austin, TX 78745; (800) 749-1460;

FAX (512) 444-2282; acoustic@inetport.com - (1,4,6-8)

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165; FAX

(508) 429-8543; americanacoustic@aol.com - (1)

Commercial Acoustics Div., 5960 W. Washington St., Phoenix, AZ 85043;

(602) 233-2322; FAX (602) 233-2033 - (2,4,6-8)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268;

(317) 692-1111; FAX (317) 692-3111; solutions@earsc.com - (1,6)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221;

FAX (617) 547-2171; eckel@eckelacoustic.com - (2,4,6-8))

Empire Acoustical Systems, 36744 Constitution Dr., Trinidad, CO 81082; (719) 846-2300;

FAX (719) 846-7466; empmkico@rmi.net - (1,4,6-8)

George Koch Sons, Inc., 10 S. 11th Ave., Evansville, IN 47744; (888) 873-5624;

FAX (812) 465-9876; ddh@kochg.com - (2,4,6-8)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555;

FAX (612) 521-5639; sales@illbruck.com - (1,4,7)

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, NY 10462; (718) 931-8000;

FAX (718) 863-1138; info@industrialacoustics.com - (2-4,6-8)

International Cellulose, 12315 Robin Blvd., Houston, TX 77045; (713) 433-6701; FAX

(713) 433-2029; icc@spray-on.com; www.spray-on.com; (7)

Jamison Door Co., P.O. Box 70, Hagerstown, MD 21741; (800) 532-3667;

FAX (301) 791-7339; sales@jamison-door.com - (2,8)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480;

FAX (614) 889-0540; vib@kineticsnoise.com - (1,4,6,7)

McGill Air Pressure Corp., 2400 Fairwood Ave., Columbus, OH 43207; (614) 443-0192;

FAX (614) 542-2620; www.mcgillairpressure.com - (1,2,3,4,5,6,7)

MPC, Inc., 835 Canterbury Rd., Westlake, OH 44145; (440) 835-1405;

FAX (440) 835-9313 - (4)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283;

(507) 641-3067; FAX (507) 644-3737; noisered@means.net - (1)

Overly Manufacturing, 574 W. Otterman St., Greensburg, PA 15601; (800) 979-7300 - (2)
Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777;
FAX (781) 246-0888 - (1-7)
Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089;
FAX (773) 235-0363 - (1,2,4,6)
Sorbothane Inc., 2144 State Rt 59, Kent, OH 44240; (330) 678-9444; FAX (330) [678-1303](tel:678-1303); sales@sorbothane.com - (5)
Sound Fighter Systems, Inc., 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640;
FAX (318) 865-7373; soundfighter@soundfighter.com; www.soundfighter.com - (4,6,7)
Sound Seal, 50 HP Almgren Dr., Agawam, MA 01001; (413) 789-1790; FAX
(413) 789-4444; sales@soundseal.com - (2,3,6,7)
Tamer Industries, 185 Riverside Ave., Somerset, MA 02725; (508) 677-0900;
FAX (508) 677-3037 - (2,4,7)
Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (1)
The E. J. Davis Co., 10 Dodge Ave., P. O. Box, North, CT 06473 (203) 239-5391;
FAX (203) 234-7724; cs@ejdavis.com; www.ejdavis.thomasre; (3)
The Kennedy Co., 11655 A1 Hwy 79, Scottsboro, AL 35768; (888) 884-6957; FAX
(256) 259-6253; vinylusa@aol.com - (126)
The Proudfoot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034;
FAX (203) 459-0033 - (1,4,6)

COMPOSITE MATERIALS

1. Barrier/Fiber Composites
2. Barrier/Foam Composites
3. Masonry Units

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165; FAX (508) 429-8543; americanacoustic@aol.com - (1)

Blachford, Inc., 1400 Nuclear Drive, West Chicago, IL 60185; (630) 231-8300; FAX (630) 231-8321 - (2)

Dodge-Regupol Inc., 715 Fountain Ave., Lancaster, PA 17601 (717) 295-3400; FAX (717) 295-3414; www.regupol.com - (1)

Duracote Corp., 350 N. Diamond St., P.O. Box 1209, Ravenna, OH 44266; (800) 321-2252; FAX (330) 296-5102; custserv@duracote.com - (2)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268; (317) 692-1111; FAX (317) 692-3111; solutions@earsc.com - (1,2)

Empire Acoustical Systems, 36744 Constitution Dr., Trinidad, CO 81082; (719) 846-2300; FAX (719) 846-7466; empmkico@rmi.net - (1)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555; FAX (612) 521-5639; sales@illbruck.com - (2)

International Cellulose, 12315 Robin Blvd., Houston, TX 77045; (713) 433-6701; FAX (713) 433-2029; icc@spray-on.com; www.spray-on.com; (7)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480; FAX (614) 889-0540; vib@kineticsnoise.com - (1,2)

McGill Air Pressure Corp., 2400 Fairwood Ave., Columbus, OH; (614) 443-0192; FAX (614) 542-2620; www.mcgillairpressure.com - (1,2,3,4,5,6,7)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283; (507) 641-3067; FAX (507) 644-3737; noisered@means.net - (2)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777; FAX (781) 246-0888 - (1,2)

Polymer Technologies Inc., 420 Corporate Blvd., Newark, DE 19702; (302) 738-9001 FAX (302) 738-9085; loretta@polytechnic.com - (2,6)

Rogers Corp., One Technology Dr., Rogers, CT 06263; (860) 794-9605; FAX (860) 779-5509 - (2)

Roush Anatrol, Inc., 935 Benecia Ave., Sunnyvale, CA 94086; (408) 481-1090; FAX (408) 481-1096 - (2)

Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089; FAX (773) 235-0363 - (1,2)

Soundcoat, Inc., 1 Burt Drive, Deer Park, NY 11729; (516) 242-2200; FAX (516) 242-2246; sales@soundcoat.com - (2)

Sound Fighter Systems, Inc., 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640; FAX (318) 865-7373; soundfighter@soundfighter.com; www.soundfighter.com - (4,6,7)

Sound Seal, 50 HP Almgren Dr., Agawam, MA 01001; (413) 789-1790; FAX (413) 789-4444; sales@soundseal.com - (2,3,6,7)

Tamer industries, 185 Riverside Ave., Somerset, MA 02725; (508) 677-0900; FAX (508) 677-3037; jhedly@tamerind.com; www.tamerind.com - (1,2)

Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131; FAX (704) 788-7772 - (1,2)

Tectum Inc., P. O. Box 3002, Newark, OH 43058; (888) 977-9691; FAX (800) 832-8869; aird@tectum.com; www.tectum.com - (1)

The E. J. Davis Co., 10 Dodge Ave., P. O. Box, North, CT 06473 (203) 239-5391; FAX (203) 234-7724; cs@ejdavis.com; www.ejdavis.thomasre; (3)

The Kennedy Company, 11665 Al Hwy 79, P.O. Box 1216, Scottsboro, AL 35768; (256) 259-4436; FAX (256) 259-6253 - (2)

The Proudfoot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034; FAX (203) 459-0033 - (1-3)

COMPOSITE SYSTEMS

1. Curtains
2. Enclosures/ Quiet Rooms
3. Open-Plan Partitions
4. Panels
5. Quilted Composites
6. Roof Decks

Acoustic Systems, 415 E St. Elmo Rd., Austin, TX 78745; (800) 749-1460;

FAX (512) 444-2282; acoustic@inetport.com - (2,4)

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165; FAX (508) 429-8543; americanacoustic@aol.com - (1,5)

Amorim Industrial Solutions; 1015 Memorial Dr., Manitowoc, WI 54220 (920) 683-9998; FAX (920) 683-9994; dkvckins@amerimsolutions.com - (2)

Commercial Acoustics, 5960 W. Washington St., Phoenix, AZ 85043; (602) 233-2322; FAX (602) 233-2033; info@mfmca.com; www.mfmca.com - (2)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221; FAX (617) 547-2171; eckel@eckelacoustic.com - (2,4)

Empire Acoustical Systems, 36744 Constitution Dr., Trinidad, CO 81082; (719) 846-2300; FAX (719) 846-7466; empmkico@rmi.net - (2-4)

George Koch Sons, Inc., 10 S. 11th Ave., Evansville, IN 47744; (888) 873-5624; FAX (812) 465-9876; ddh@kochg.com - (2-4)

Illbruck, Inc., 3800 Washington Ave., Minneapolis, MN 55412; (612) 521-3555; FAX (612) 521-5639; sales@illbruck.com - (1,2,4,5)

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, NY 10462; (718) 931-8000; FAX (718) 863-1138; info@industrialacoustics.com - (2,4)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480; FAX (614) 889-0540; vib@kineticsnoise.com - (1,2,4,5)

McGill Air Pressure Corp., 2400 Fairwood Ave., Columbus, OH 43207; (614) 443-0192 FAX (614) 542-2620; www.mcgillairpressure.com - (1,2,3,4,5,6,7)

MPC, Inc., 835 Canterbury Rd., Westlake, OH 44145; (440) 835-1405; FAX (440) 835-9313 - (4)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283; (507) 641-3067; FAX (507) 644-3737; noisered@means.net - (1)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777; FAX (781) 246-0888 - (1-5)

Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089; FAX (773) 235-0363 - (1,2,4,5)

Soundcoat, Inc., 1 Burt Drive, Deer Park, NY 11729; (516) 242-2200; FAX (516) 242-2246; sales@soundcoat.com - (2)

Sound Fighter Systems, Inc., 6135 Linwood Ave., Shreveport, LA 71106; (318) 861-6640;
FAX (318) 865-7373 - (2,4)

Sound Seal, 50 HP Almgren Dr., Agawam, MA 01001; (413) 789-1790; FAX
(413) 789-4444; sales@soundseal.com - (2,3,6,7)

Tamer Industries, 185 Riverside Ave., Somerset, MA 02725; (508) 677-0900;
FAX (508) 677-3037 - (2,4)

Technical Mfg., 15 Centennial Dr., Peabody, MA 01960; (978) 532-6330; FAX
(978) 531-8682; sales@techmfg.com - (2)

Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (1,5)

Tectum, Inc., P.O. Box 3002, Newark, OH 43058; (888) 977-9691; FAX (800) 832-8869;
arid@tectum.com - (6)

The Proudfoot Co., Inc., P.O. Box 276, Monroe, CT 06468; (800) 445-0034;
FAX (203) 459-0033 - (1,2,4,5)

VIBRATION DAMPENING MATERIALS

1. Active Dampers
2. Adhesives
3. Constrained-Layer Composites
4. Coatings
5. Sheets
6. Tapes

3M Acoustical Control; 3M Center - 220 - 7E - 01, St. Paul, MN 55144; (651) 733-5245; FAX (651) 733-1771; daharman@mmm.com - (2,5,6)

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165; FAX (508) 429-8543; americanacoustic@aol.com - (2,3,5)

Amorim Industrial Solutions; 1015 Memorial Dr., Manitowoc, WI 54220 (920) 683-9998; FAX (920) 683-9994; dkvckins@amerimsolutions.com - (3,5)

BASF Corp.; 1609 Biddle, Wyandotte, MI, 48192; (734) 324-6292; FAX (734) 324-5245 edwardga@basf.com; - (1)

Blachford, Inc., 1400 Nuclear Drive, West Chicago, IL 60185; (630) 231-8300; FAX (630) 231-8321 - (6)

Dodge-Regupol Inc., 715 Fountain Ave., Lancaster, PA 17601 (717) 295-3400; FAX (717) 295-3414; www.regupol.com - (5)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268; (317) 692-1111; FAX (317) 692-3111; solutions@earsc.com - (3,6)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221; FAX (617) 547-2171; eckel@eckelacoustic.com - (6)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480; FAX (614) 889-0540; vib@kineticsnoise.com - (4,6,7)

Material Sciences Corp., 2200 E. Pratt Blvd., Elk Grove, IL 60007; (847) 718-8110 FAX (847) 718-8862; bandc@interaccess.com; www.laminatesandcompo.com - (3,4,5)

McGill Air Pressure Corp., 2400 Fairwood, Ave., Columbus, OH 43207; (614) 443-0192; FAX (614) 542-2620; www.mcgillairpressure.com - (1,2,3,4,5,6,7)

MTS Systems, 14000 Technology Dr., Minneapolis, MN 55344; (800) 933-4617; info@mts.com; www.mts.com - (1)

Noise Reduction Corp., 32321 County Highway 25, Redwood Falls, MN 56283; (507) 641-3067; FAX (507) 644-3737; noisered@means.net - (7)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777; FAX (781) 246-0888 - (3,4,6)

Polymer Technologies Inc., 420 Corporate Blvd., Newark, DE 19702; (302) 738-9001 FAX (302) 738-9085; loretta@polytechnic.com - (2,6)

Roush Anatrol, Inc., 935 Benecia Ave., Sunnyvale, CA 94086; (408) 481-1090; FAX (408) 481-1096 - (2,3,6,7)

Singer Safety Company, 2300 W. Logan Blvd., Chicago, IL 60647; (800) 621-0089;
FAX (773) 235-0363 - (1-4,6)

Sorbothane, Inc., 2144 State Rt. 59, Kent, OH 44240; (330) 678-9444; FAX (330) 678-1303 -
(6)

Soundcoat, Inc., 1 Burt Drive, Deer Park, NY 11729; (516) 242-2200; FAX (516) 242-2246;
sales@soundcoat.com - (2-4,6,7)

Sound Seal, 50 HP Almgren Dr., Agawam, MA 01001; (413) 789-1790; FAX
(413) 789-4444; sales@soundseal.com - (2,3,6,7)

Sterling Instrument, 2101 Jerico, New Hyde, NY 11042; (516) 328-3300; FAX
(516) 326-8827; support@sdp-si.com; www.sdp-si.com - (5)

Stock Drive Products, 2101 Jericho Tpk., Box 5416, New Hyde Park, NY 11042;
(516) 328-3300; FAX (516) 326-8827; support@sdp-si.com - (6)

Technicon Industries, Inc., 4412 Republic Dr., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772 - (1,3,4)

VIBRATION ISOLATION SYSTEMS

1. Active Isolators
2. Bases
3. Cable Isolators
4. Elastomeric
5. Floating Floors
6. Machinery Mounts
7. Pipe Connectors
8. Pneumatic
9. Seismic
10. Steel Spring
11. Vibration Dampers

American Acoustical, 6 October Hill Road, Holliston, MA 01746; (508) 429-1165; FAX (508) 429-8543; americanacoustic@aol.com - (2,3,5)

Amorim Industrial Solutions; 1015 Memorial Dr., Manitowoc, WI 54220 (920) 683-9998; FAX (920) 683-9994; dkvckins@amerimsolutions.com - (3,5)

Amber/Booth Co., 6645 W. Tidwell, Houston, TX 77092; (713) 688-1228; FAX (713) 688-1175 - (1,2,4-11)

BASF Corp.; 1609 Biddle, Wyandotte, MI, 48192; (734) 324-6292; FAX (734) 324-5245 edwardga@basf.com; - (1)

Colbond Inc., P. O. Box 1057, Euka, NC 28728; (800) 365-7391; FAX (828) 665-5009 www.colbond-usa.com - (5)

Dodge-Regupol Inc., 715 Fountain Ave., Lancaster, PA 17601 (717) 295-3400; FAX (717) 295-3414; www.regupol.com - (5)

E-A-R Specialty Composites, 7911 Zionsville Rd., Indianapolis, IN 46268; (317) 692-1111; FAX (317) 692-3111; solutions@earsc.com - (4,6,11)

Fabreeka International, Inc., 1023 Turnpike St., P.O. Box 210, Stoughton, MA 02072; (781) 341-3655; FAX (781) 341-3983; info@fabreeka.com - (1-11)

Firestone Industrial Products Co., 12650 Hamilton Crossing Blvd., Carmel, IN 46032; (317) 818-8662; FAX (317) 818-8710 - (8)

Gerb Vibration Control, 1950 Ohio St., Lisle, IL 60532; (630) 724-1660; FAX (630) 724-1664; gerbusa@gerb.com; www.gerb.com - (1,2,5,9,10,11)

Kinetic Systems, Inc., 20 Arboretum Rd., Boston, MA 02131; (617) 522-8700; FAX (617) 522-6323; sales@kineticssystem.com - (1-3,6,8,11)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480; FAX (614) 889-0540; vib@kineticsnoise.com - (2,4-7,9-11)

Machinery Mountings Inc., 11 Constance Ct., Hauppauge, NY 11788; (631) 851-0480; FAX (631) 851-0479 (6,10,11)

Material Sciences Corp., 2200 E. Pratt Blvd., Elk Grove, IL 60007; (847) 718-8110
FAX (847) 718-8862; bandc@interaccess.com; www.laminatesandcompo.com - (3,4,5)
MTS Systems, 14000 Technology Dr., Minneapolis, MN 55344; (800) 933-4617;
info@mts.com; www.mts.com - (1)
Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777;
FAX (781) 246-0888 - (4)
Polymer Technologies Inc., 420 Corporate Blvd., Newark, DE 19702; (302) 738-9001
FAX (302) 738-9085; loretta@polytechnic.com - (2,6)
Roush Anatrol, Inc., 935 Benecia Ave., Sunnyvale, CA 94086; (408) 481-1090;
FAX (408) 481-1096 - (11)
Sorbothane, Inc., 2144 State Rt. 59, Kent, OH 44240; (330) 678-9444; FAX (330) 678-1303 -
(6,11)
Sound Seal, 50 HP Almgren Dr., Agawam, MA 01001; (413) 789-1790; FAX
(413) 789-4444; sales@soundseal.com - (2,3,6,7)
Stock Drive Products, 2101 Jericho Tpk., Box 5416, New Hyde Park, NY 11042;
(516) 328-3300; FAX (516) 326-8827; support@sdp-si.com - (2-4,6,11)
Technical Manufacturing Corp., 15 Centennial Dr., Peabody, MA 01960; (978) 532-6330;
FAX (978) 531-8682; sales@techmfg.com - (1,8)
Technicon Industries Inc., 4412 Republic Ct., Concord, NC 28027; (704) 788-1131;
FAX (704) 788-7772; sfurr@tenind.com - (2,4,5)
The Noble Co., P. O. Box 350 Grand Haven, MI 44417; (800) 878-5788;
FAX (231) 799-8850; sales@noblecompany.com; www.noblecompany.com - (5)
Vibration Isolation, P. O. Box 2083, Houston, TX 77252; (713) 466-1562
FAX (713) 466-1355; sales@vip-tx.com - (2,4,10)
Vibration Mountings and Controls, Inc., 113 Main St., Bloomingdale, NJ 07403;
(800) low-vibe; FAX (201) 492-8430; plittlewood@vmc-kdc.com - (3,4,6,7,9-11)
Vibro/Dynamics Corporation, 2443 Braga Dr., Broadview, IL 60153; (708) 345-2050;
FAX (708) 345-2225; vibro@worldnet.att.net - (6)

SILENCERS

1. Active Attenuators
2. Ducts
3. Duct Silencers
4. Electric Motor Silencers
5. Fan Silencers
6. Filter Silencers
7. General Industrial Silencers
8. High-Pressure Exhaust Silencers
9. Intake and Exhaust Silencers
10. Pulsation Dampers
11. Splitter/Louvre Silencers

Airsan Corp., 4554 W. Woolworth Milwaukee, WI 53218; (800) 558-5494; FAX (414) 353-8402; www.airsan.com - (3,5,11)

Allied Witan Co., 13805 Progress Pkwy, Cleveland, OH 44133; (440) 237-9630; FAX (440) 237-9633; (6,8,9,10)

Beaird Industries Inc., 601 Benton Kelly St., Shreveport, LA 71106; (318) 865-6351 FAX (318) 868-1701; www.beairdindustries.com - (3,5,6,7,8,9)

Burgess-Manning, Inc., 227 Thorn Ave., Orchard Park, NY 14127; (716) 662-6540; FAX (716) 662-6548; info@nitram.com - (6-10)

Commercial Acoustics Div., 5960 W. Washington St., Phoenix, AZ 85043; (602) 233-2322; FAX (602) 233-2033 - (2-5,7-9,11)

Eckel Industries, Acoustic Div., 155 Fawcett St., Cambridge, MA 02138; (617) 491-3221; FAX (617) 547-2171; eckel@eckelacoustic.com - (9)

Exair Corp., 1250 Century Cr N., Cincinnati, OH 45246; (800) 903-9247; FAX (513) 671-3363; techhelp@exair.com; www.exair.com - (7)

Industrial Acoustics Co., Inc., 1160 Commerce Ave., Bronx, NY 10462; (718) 931-8000; FAX (718) 863-1138; info@industrialacoustics.com - (1,3,5,7-9,11)

Kinetics Noise Control, Inc., 6300 Ireland Pl., Dublin, OH 43017; (614) 889-0480; FAX (614) 889-0540; vib@kineticsnoise.com - (2,3,5,8,9,11)

McGill Air Pressure Corp., 2400 Fairwood Ave., Columbus, OH 43207 (614) 443-0192 FAX (614) 542 2620; www.mcgillairpressure.com - (1,2,3,4,5,6,7)

Patterson Associates, 935 Summer St., Lynnfield, MA 01940; (781) 334-5777; FAX (781) 246-0888 - (2,3,5,7,9)

QuietFlo Noise Control 100B Airport Executive Park, Nanuet, NY 10954; (845) 352-8877; FAX (845) 352-4464; (3,4,5,7,8,9)

Stoddard Silencers, Inc., 1017 Progress Dr., Grayslake, IL 60030; (847) 223-8636; FAX (847) 223-8638; info@stoddardsilencersinc.com - (5-9,11)

The Spencer Turbine Co., 600 Day Hill Rd., Windsor, CT 06095; (860) 688-8361 - (3-6,8,9)

The Kennedy Company, 11665 Al Hwy 79, P.O. Box 1216, Scottsboro, AL 35768; (256) 259-4436; FAX (256) 259-6253 - (3)

APPENDIX C

Partial Listing of Aftermarket Cab Manufacturers,
Suppliers of Stud-Welding Systems

I. MOBILE SURFACE EQUIPMENT CAB MANUFACTURERS

Custom Products of Litchfield
1715 South Sibley Avenue
Litchfield, MN 55355
(320) 693-3221
Custom-made Cabs

Cabs & Rops, Inc.
2112 Staffeldt Road
Iron River, WI 54847
(715) 372-8864
New and Reconditioned Cabs

Saf-T-Cab, Inc.
3241 South Parkway Drive
Fresno, CA 93725
(559) 268-5541
Large Line of Aftermarket Cabs

Sims Manufacturing Company
230 North Maple Street
Payne, OH 45880
(419) 263-2321
*O.E.M. for Caterpillar, John Deere, Case;
Some Aftermarket Cabs*

X-Mark/Cdt, Inc.
2001 North Main Street
Washington, PA 15301
(724) 228-7373
*Rock Drill Cabs - Primarily for Ingersoll-
Rand*

Lake Superior Cab Company
118 West Harney Road
Esko, MN 55733
(218) 879-4526
Reconditioned Cabs, ROPS Skin Kits

Kenco Manufacturing Company
Highway 69S
Atoka, OK 74525
(580) 889-5222
New Cabs Only

Industrial Cab Company
1850 Oliver Avenue
Indianapolis, IN 46221
(317) 638-8145
Manufactures O.E.M. Cabs

II. STUD WELDERS, STUDS, COVER BUTTONS

Nelson Stud Welding
5213 Broadlea Drive
Pittsburgh, PA 15236
(412) 653-9344

Stud Welding Company
750 Glen Avenue
Moorestown, NJ 08057
(856) 866-9300

III. STICK-ON STUDS (SELF-ADHESIVE BACK)

Barrier Corporation
Tigard Industrial Park
9908 South West Tigard Street
Tigard, OR 97223
(503) 639-4192

APPENDIX D

Partial Listing of Reference Source

I. TRADE JOURNALS

- A. Industrial Hygiene News
8650 Babcock Boulevard
Pittsburgh, Pennsylvania 15237-9916
- B. Industrial Maintenance and Plant Operation
PO Box 7682
Highlands Ranch, Colorado 80163-9482
- C. Material Handling Products News
301 Gibraltar Drive
PO Box 618
Morris Plains, New Jersey 07950-0618
- D. New Equipment Digest
A Penton Publication
PO Box 5113
Pittsfield, Massachusetts 01203-9166
- E. Pollution Equipment News
8650 Babcock Boulevard
Pittsburgh, Pennsylvania 15237-9915

II. MAGAZINES

- A. Coal Age
PO Box 12977
Overland Park, Kansas 66282-9859
- B. Rock Products
PO Box 12977
Overland Park, Kansas 66282-9859
- C. Sound & Vibration
PO Box 40416
Bay Village, Ohio 44140-9902
- D. Sensors
PO Box 5102

Pittsfield, Massachusetts 01203-5102

- E. Mobile Radio Technology
PO Box 12968
Overland Park, Kansas 66282-2968
- E. Aggregates Manager
PO Box 823
Winchester, Massachusetts 01890-4223
- F. Occupational Safety and Health
Creative Data
650 South Clark Street, Floor 6
Chicago, Illinois 60605-9626
- G. Occupational Hazards
PO Box 217
Buffalo, New York 14205-9818

III. GOVERNMENT PUBLICATIONS

- A. "Noise Abatement of Pneumatic Rock Drill," Report of Investigations (RI) 7998, U.S. Department of Interior, U.S. Bureau of Mines (USBM), 1974.
- B. "Noise Reduction of a Pneumatic Rock Drill," RI 8082, U.S. Department of Interior, USBM, 1975.
- C. "Noise Control Proceedings," Informational Circular (IC) 8686, U.S. Department of Interior, USBM, 1975.
- D. "Noise Control of Diesel-Powered Underground Mining Machines," IC 8837, U.S. Department of Interior, USBM, 1979.
- E. "Bulldozer Noise Control," Contract Number J0177049, Bolt, Beranek, and Newman, Inc., U.S. Department of Interior, USBM, 1980.
- F. "Front-End Loader Noise Control," Contract Number J0395028, Bolt, Beranek, and Newman, Inc., U.S. Department of Interior, USBM, 1980.

- G. "Mining Machinery Noise Control Guidelines," U.S. Department of Interior, USBM, 1983.
- H. "Fabrication Manual for a Reduced-Noise Auger Miner Cutting Head," IC 8971, U.S. Department of Interior, USBM, 1984. "Retrofit Noise Control Modifications for Crushing and Screening Equipment in the Nonmetallic Mining Industry – An Applications Manual," IC 8975, U.S. Department of Interior, USBM, 1984.
- I. "Noise Control of an Underground Continuous Miner-Auger Type," Informational Report (IR) 1056, U.S. Department of Labor, Mine Safety and Health Administration (MSHA), 1977.
- J. "Improving Barrier Insertion Loss," IR 1117, U.S. Department of Labor, MSHA, 1980.
- K. "Compendium of Materials for Noise Control," NIOSH Publication No. 80-116, 1980.
- L. "Summary of Noise Controls for Mining Equipment," U.S. Department of Labor, MSHA, 1985.
- M. "In-Plant Partial Noise Enclosures for the Mining Industry," IF 1154, U.S. Department of Labor, MSHA, 1993.

IV. REFERENCE BOOKS

- A. "Noise Control for Buildings and Manufacturing Plants," Bolt, Beranek, and Newman, Inc., 1981.
- B. "Noise and Vibration Control," Leo Beranek, 1971.
- C. "Handbook of Noise Control, Cyril Harris, 1957.